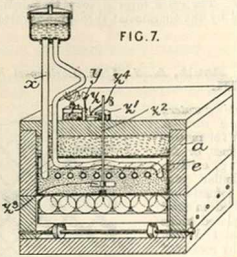
7970. Dame, W. April 6, 1906, [*date applied for under Patents Act, 1901*].

FIG. 7.



Heat-storing apparatus; heating by chemical action; thermostats &c.—In an incubator, a substance the melting or boiling point of which is at the temperature of incubation is used as a heat carrying and regulating medium, so that the latent heat of the substance is supplied to the eggs and the temperature maintained constant. A mixture of certain proportions of hard and soft paraffin is suitable. The substance may be utilized in many ways. A tank, capsules of "formal gelatine," or balls of glass, may be filled with it, heated, and laid with the eggs in a box of straw or other non-conductor and covered with cotton-wool. Metal wool may be placed within the balls to distribute the heat, and an inner ball containing a substance with a higher melting-point may also be used. If a tank is used, it may be partly supported by spring or friction devices, and may have windows or be of glass to allow the contents to be seen. Instead of the substance being previously heated, the heat may be supplied in various other ways. A vessel may be placed on the tank and filled with hot water, a body with a higher melting-point, dilute sulphuric acid to which iron filings are added periodically, or caustic soda or lime to which acid is slowly added. Or water in the vessel may be heated by steam supplied from a boiler. The boiler may be arranged with a balance weight so that when empty it is removed from the flame, and the vacuum formed causes the water to return. As shown in Fig. 7, the tank *e* contains the heat-regulating medium within the box *a*, the eggs being placed in a drawer beneath it. It is heated by means of water circulating in the pipes *x* and heated by a spirit lamp. In the tank *e* is arranged a vane z^3 mounted on a vertical spindle z^2, which carries at the top a block z^1. On the block is an arm *z* to which is attached the spring z^4, which is not strong enough to overcome the friction between the block z^1 and the spindle z^2; if the substance in the tank *e* melts, the vane is released and the spring pulls the arm *z* from engagement with the extinguisher *y*, which partly or wholly extinguishes the lamp, thus preventing overheating. A liquid, such as methylal, methylene chloride, or carbon bisulphide, that boils at the required temperature may be used by passing its vapour through a coiled tube to a condenser, from which the liquid is returned to the boiler. Other liquids, for example ether, may be used if the pressure in the boiler is regulated to adjust the boiling-point. The pressure may be varied to raise the temperature as the process of incubation proceeds. When the double hollow ball is used, the heat may be supplied from the inner space by means of hot water, caustic potash and sulphuric acid, water and lime, heated sodium acetate or bees-wax, or short-circuited galvanic elements. For use as a fostermother, the apparatus may be provided with doorways, and in some cases the insulating-box may be simply inverted.

8368. Lloyd, W., Lloyd, J., and **Nicholson, S. T.** May 7, 1906, [*date applied for under Patents Act, 1901*].

FIG. 1a

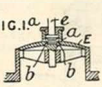
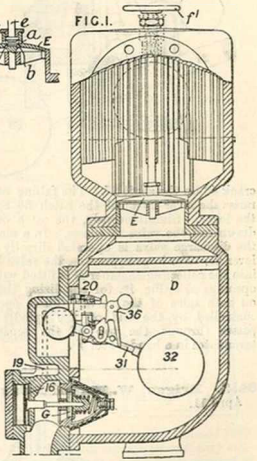


FIG. 1.



Steam traps.—Relates to blow-out apparatus for steam separators. According to the arrangement shown in Fig. 1, the discharge valve G is actuated by steam admitted to a cylinder 16 through a passage 19 and valve 20. This valve is normally kept closed by a spring 24, Figs. 3 and 4, and is opened automatically from a shaft 27 by a weighted lever 28. The float-lever 31 is connected with the lever 28 by a pin 33 and slot. With the parts in the position shown in Figs. 1 and 3, the valve 20 is closed and the lever 28 is held in the raised position by a catch-lever 36. The rising of the float 32 disengages the catch 36 by means of a

roller 38, thereby allowing the weight 28 to fall and open the valve. The lever 22 carrying the valve 20 is now kept in the raised position by a spring catch 39, Fig. 4, which is connected to a

FIG.3.

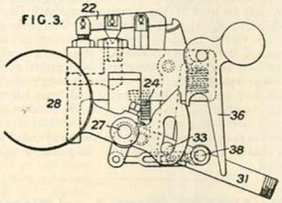
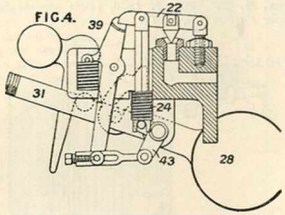


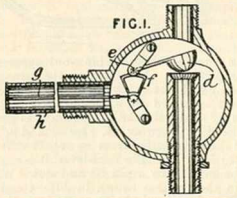
FIG.4.



crank 43 on the shaft 27. The falling of the float raises the lever 28 until the catch 36 again locks the lever. Simultaneously, the catch 39 is withdrawn and the valve 20 closes. In a modification, the discharge valve is operated directly from the lever 22. For large apparatus, the valve E opening into the collecting-chamber D is fitted with by-pass openings *a*, *b*, Fig. 1[a], for equalizing the pressure on both sides of the valve. These openings are controlled by the end of the spindle *e*, which passes through the top of the separator and terminates in a hand-wheel f^1.

8452. Briggs, W. M., and **Briggs, F. C.** April 11.

FIG.1.

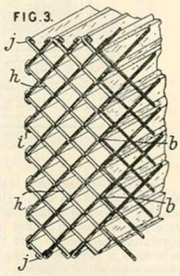


Thermostats.—In valve-controlling apparatus for automatically regulating temperature, of the type in which are employed an expansible tube *h* and a rod *g*, the valve *d* is carried by one end of a pivoted lever suitably connected to the rod *g*, for example by means of a pinion *e* and the pivoted toothed sector *f*. The valve lever *d* may be a bell-crank actuated by the thermostat through a pivoted arm.

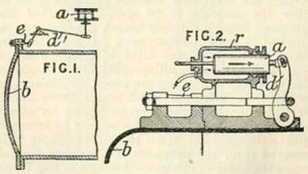
8458. Boult, A. J., [*Soc. Loziano et Finet*]. April 11.

Heating water; heating air.—A radiator for motor-car engines, or for heating, cooling, and similar purposes, consists of corrugated metal plates placed ridge to ridge and connected by means of wires threaded through holes *b* in the ridges of contiguous sheets. The wires, which space the plates apart, are bent over at their ends *i*, *j*, to secure the plates together. The whole is dipped in a bath of molten tin to close the spaces *h* between the ends of the plates. The ridges of the plates may be flattened. Instead of two plates being placed together, a single plate may be folded upon itself to form the air and liquid channels.

FIG.3.



8473. Stöffler, E. April 11.



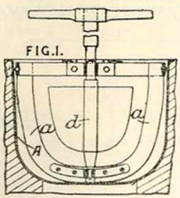
Digesters.—Relates to means for tightening the bolts used for holding down the covers *b* of pressure vessels, and consists in providing each bolt with a lever which is pivotally secured to the pressure vessel and to a small pressure piston. As shown in Fig. 1, the bolt *e* holds the cover tight against the flange when the piston is forced upwards, a bell-crank lever *d* being used as the connecting-means. As shown in Fig. 2, the pressure piston *a* is parallel to the axis of the larger vessel, the pistons being arranged in a hollow ring *r*. The bolts *e* are tightened through the levers *d*.

8478. Auner, F. *Sept. 26.*

Non-conducting coverings and compositions are prepared as follows. Wood waste is treated with a solution of size or the like and subsequently with a hardening-solution, such as aluminium salts or potassium bichromate. The material is then dried and ground and mixed with a binding-agent, such as glue containing a small amount of potassium bichromate, together with oatmeal, linseed meal, or other starch, gum, or varnish containing substances. The material may be hardened by the addition of the mineral matters, such as infusorial earth, chalk, fine alumina, kaolin, or finely powdered peat, and toughened by the addition of from 5 to 10 per cent of chopped textile fibre, rags, hemp, jute, or the like. Colouring-matters may also be added. The materials are thoroughly mixed, subjected to the action of steam in a closed vessel, and moulded under pressure.

8553. Burkill, C., McQuire, J., and **Armitage, W. J.** April 12.

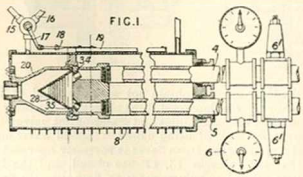
FIG.I.



Boiling-pans.—A domestic washing-appliance consists of a stirrer *d* rotatable within a cage, which is formed of bars *a* and removably inserted in a copper A, being secured therein by means of clamping-screws. The stirrer and its upper bearing may be made readily detachable.

8819. Hopkins, G. W. April 16.

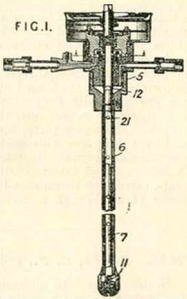
FIG.1



Thermostats.—The water jacket 8 of a blow-pipe or other burner for mixtures of acetylene and air is supplied with hot and cold water by pipes 16, 15 respectively, the supply being controlled by a three-way cock operated automatically by an arm 17, an adjustable and graduated link 18, and a gutta-percha &c. bar 19, which is affected by the heat of the jacket 8.

8854. Lake, H. H., [*H. & M. Automatic Regulator Co.*]. April 16.

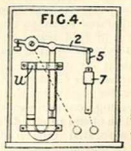
FIG.I.



Thermostats.—In thermostats of the type illustrated in Fig. 1, comprising an outer tube 6 attached to a valve casing 5 and enclosing a member carrying the valve 12 controlling the passage of motive fluid to a heat controller, the inner member is in the form of a tube 7 which is perforated, as shown at 21, to permit communication between its interior and the annular space between the two tubes. The flange at the outer end of the tube 7 is pressed against the end of the tube 6 by the spring 11.

9018. Taylor, J. April 18.

FIG.4.



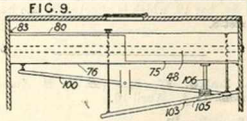
Thermostats.—In apparatus for automatically drawing a blanket &c. over a bed or couch when the temperature of the room falls below a certain limit, an electro-magnet is arranged in a circuit fitted with a thermal switch. The switch, shown in Fig. 4, consists of a U-shaped tube having ether in the closed limb *u*. A float resting on the surface of mercury contained in the bend of the tube bears against a pivoted lever 2 which is connected to one terminal. The lever carries a contact-maker 5 arranged to dip into a mercury cup 7 connected to the other terminal.

9357. Bihn, S. F. April 22.

Thermostats.—An incubator, comprising several compartments heated by hot-water pipes, is provided with means for regulating the temperature in each compartment separately as well as means

for controlling the general temperature. A thermostat consisting of several corrugated-disk chambers, filled with a volatile liquid or a gas, supports a rod connected by means of a regulating-screw to

FIG. 9.



a balance lever which carries a damper. A similar thermostat is placed in each compartment, just above the eggs and connected to a device for enclosing the hot-water pipes. Plates 75, 80 of non-conducting material forming shields above and below each pipe are hinged at one end 76, 83, and are provided with flanges extending downwardly and upwardly respectively, throughout half their length. The upper plates are connected together and have their free ends connected to a lever 100, the other end of which is linked to the lower plates. Another rod 103, attached adjustably to the upper plate, carries the thermostat 105, which acts on the lower plate through a rod 106. Thus, as the temperature varies the shields move to expose or enclose the hot-water pipes.

9475. Evans, H. April 23.

FIG. 1.

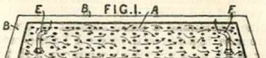


FIG. 2.

Footwarmers.—A motor-car footwarmer, an underside view of which is shown in Fig. 1, consists of a frame B and two plates A, A^1 forming a shallow metal box which is placed on, or hinged to, a footboard and warmed by the circulating water of the motor. The lower plate A is indented as at C, Fig. 2, and is connected by standards D to the upper plate A^1, which may be scored. The water enters and leaves through connexions E, F, which may be flexible or telescopic to enable the warmer to be turned up out of the way.

9486. Jones, C. J., and **Still, W. M.** April 23.

Heating water.—In apparatus for heating water by means of steam, intended chiefly for use with lavatory basins in railway vehicles, steamships, buildings, &c., a valve-controlled by-pass leads from the cold-water inlet to the hot-water outlet, and the steam-inlet, water-outlet, and by-pass valves are simultaneously operated so as to supply either hot or cold water. Figs. 6 and 8 show vertical sections, at right angles, of the surface apparatus employed to heat the water together with the attached casing containing the valves. The steam inlet 13 leads to the perforated pipe 5 distributing the steam around the tubes 4 through which the water flows from the inlet 17 and pipe 6 to the outlet by way of passages 17^c, 17^a. A by-pass duct 17^c leads from the inlet 17 to the outlet passage 17^a, and is provided with a valve 18 normally closed by a spring 19 resting against a cap 20 removable for adjustment &c. of the valve. The spindle of the latter is attached to a diaphragm 23 clamped against the valve casing, and is operated by a multiple-armed lever 28 pivoted at 24 and connected to a lever pivoted to the basin tap. Valves similar to the valve 18 are placed in the water-outlet passage 17^c and the steam inlet 13, and are also actuated by the lever 28. To obtain hot water, one end of the basin lever is depressed, thus operating the lever 28 to open the steam-inlet and water-outlet valves, the by-pass valve 18 being closed. If cold water only is required, the basin lever is reversely operated so that the passages 13, 17^c are closed, and the by-pass opened to allow water to flow directly from the inlet 17 to the outlet 17^a without entering the surface apparatus.

FIG. 6.

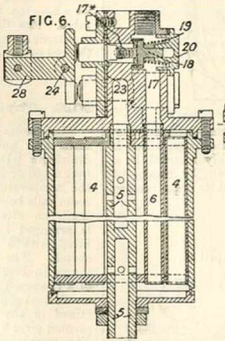
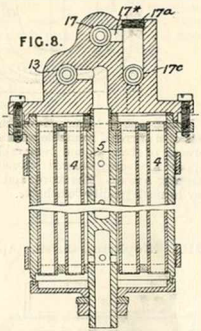
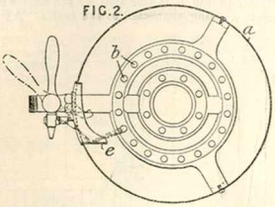


FIG. 8.



9660. Ewart & Son, and **Ewart, G. H.** April 25.

FIG. 2.



Heating water.—In a water-heater or gas geyser fitted with the pilot-light device described in Specification No. 5242, A.D. 1907, a plate *e* is fitted in the casing *a* so as to deflect the pilot-flame towards the main burner *b* before the gas supply to the main burner is completely turned on.

9684. British Thomson-Houston Co., [*General Electric Co.*]. April 25.

FIG. 3.

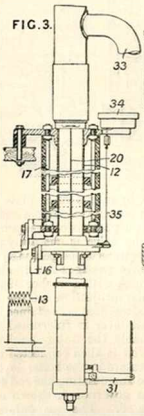
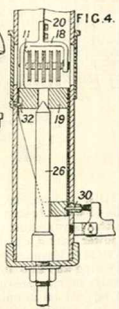


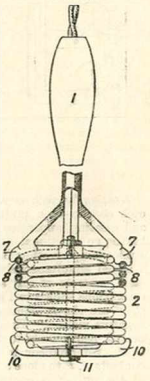
FIG. 4.



Heating by electricity.—The drying-oven used in a wire-enamelling machine is closed at the bottom and is electrically heated. As shown in Fig. 3, the current from the transformer 13 is led through the conductor bars 17 to the top of the metallic tube 12, which carries the current to the terminal 16, and is thereby heated, the heat being kept in by the lagging surrounding the oven. A flue 33 serves to carry away the waste gases. The sheaves 11 are, as shown in Fig. 4, rotatably mounted in the oven on a bracket 18, which is carried by a strap 20 passing out at the top of the oven and over a wheel, which is driven by worm gear. The sheaves being movable are thus easily strung, and the pin 26 serves to guide the bracket in a central position; a guide-pin 32 accurately determines the position of the base 19 and bracket 18, and a pin 30 controlled by the lever 31 serves to lock the whole in position. Specifications No. 4346, A.D. 1903, and No. 9686, A.D. 1907, [*Abridgment Class* Electricity, Conducting &c.], are referred to.

9921. Howell, J. T. May 7, 1906, [*date applied for under Patents Act, 1901*].

FIG. 1.

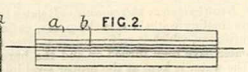


Heating by electricity.—In apparatus for heating by electricity, for example for cooking, water-heating, &c. purposes, the resistance element consists of a thin wire enclosed by a preferably sealed glass or like tube which is then inserted in a copper or other heat-conducting sheath. The whole is then heated and bent into the desired form. In place of the glass tube, glass beads may be threaded on the wire at intervals. In the application as a submersible water heater, shown in Fig. 1, the resistance element 2 is clamped by a bolt 11 between two sets of arms 7, 10, recessed at 8 to receive the coils, and carried by a handle 1. For heating water in a pipe, the resistance element may be threaded in the pipe, the water then traversing the annular space outside the element.

10,088. Courtecuisse, V. May 1, 1906 [*date applied for under Patents Act, 1901*].

FIG. 1.

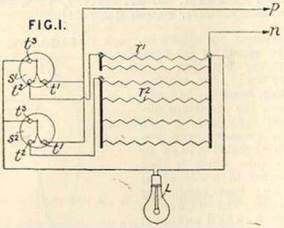
FIG. 2.



Heating by electricity.—For singeing a thread, it is passed through a slit tube *b* of a few millimetres in diameter heated by an electric current. The tube is composed of platinum or of an alloy of platinum and rhodium &c., and is embedded as

shown in a hollow fire-proof block *a* filled with a suitable fire-proof paste. Suitable means are introduced into the circuit of the current by which its tension may be regulated. The Specification in the original form as published under the Act of 1901 comprises also the singeing of threads or fabrics by passing them close to one or more heated metallic surfaces, which may be heated by electricity and embedded in refractory material. This subject-matter does not appear in the Complete Specification as accepted.

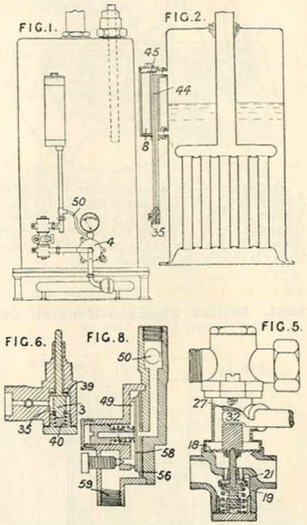
10,119. Newbery, G. M., and **British Prometheus Co.** May 1.



Heating by electricity.—The current supplied to each section of a multiple-circuit electric cooking and heating apparatus is controlled by a switch having an additional contact for passing current to a pilot lamp or other indicating-device so as to give a signal simultaneously with the bridging of the main contacts of any section. In the diagram of connexions shown in Fig. 1, two resistance sections r^1, r^2 are shown connected at one end with the negative main *n*. Their other ends are shown connected respectively to two contacts t^2 on switches s^1, s^2. Simultaneously with the bridging of the contacts t^1, t^2 to close a heating-circuit, the live part of the switch is connected to a third contact t^3, causing a pilot lamp L or other indicating-device to be switched in.

10,148. Jones, C. J., and **Still, W. M.** May 1.

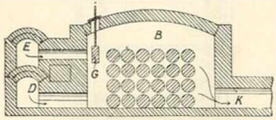
Heating water; thermostats.—Relates to apparatus for boiling water for making tea, coffee, and like infusions, which is self-regulating after the gas and water have been turned on and the burner lighted. The water is kept at the proper level by means of a float-operated valve 35 arranged at a distance below the water inlet of the boiler so as to remain cool. The gas supply is controlled by the apparatus shown in Fig. 8, which is operated by the steam pressure in the boiler. The gas and water supply is also controlled by means of a double valve, which may be of the form shown in Fig. 5, which opens or closes the gas and water supply passages simultaneously. The water-supply valve 35, shown separately in Fig. 6, is operated by the float 8 contained in a casing connected to the boiler. As the



float falls, it depresses, by means of a plate 45, a spindle 44 which bears upon the valve stem and thus opens the valve against the pressure of the spring 40. The lower part 3 of the valve is cut away at its edges so as to leave projections which guide the valve in its casing and also form passages for the water. The valve may be provided with a washer 39 which bears against an annular projection on the valve seat. In a modification, the float is contained in the boiler itself and the float lever is fulcrumed to an adjustable block to enable the water level to be regulated. The valve-rod is then connected to the rod 44. The steam pressure in the boiler is transmitted through the pipe surrounding the rod 44 and a branch 50 to the gas governor 4, shown on an enlarged scale in Fig. 8. The gas enters the chamber 49 and is admitted to the outlet 59 by the valve 58, which is controlled by a valve actuator 56 operated by the steam pressure. Two forms of double valve for controlling the gas and water supply are described. As shown in Figs. 1 and 5, two similar lift valves 19 are arranged at opposite ends of a casing. The valves are attached to blocks 27 separated by the non-circular end 32 of a shaft which is provided with a handle. When the

handle is turned the blocks are forced apart, thus opening the valves. The blocks project through diaphragms 18. Each valve is recessed to receive packing and is seated against an annular projection 21 by a spring. In the other form of valve, two projecting diaphragm valves are connected by a cross-bar, mounted on a common spindle so as to be simultaneously operated. Specification No. 10,148A, A.D.1907, [*Abridgment Class* Tea &c.], is referred to.

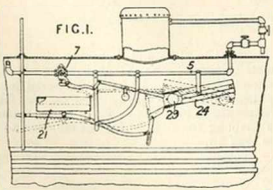
10,185. Stobie, V. May 2.



Heating-apparatus.—In a method of annealing, heating, or malting oxidizable materials without causing oxidation thereof, the chamber B in which the material is to be treated is filled with combustible gas supplied at D, and the chamber, atmosphere, and material are raised to and maintained at the required temperature by the combustion of a relatively small quantity of air, which is admitted at E to the chamber and ignited by means of a red-hot iron G. The combustible gas is maintained at all times in great excess over the air supply. The products of combustion pass out at K.

10,553. Wallace, J. B. July 27, 1906, [*date applied for under Patents Act, 1901*].

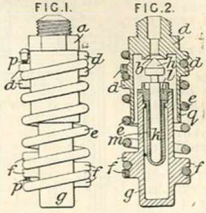
FIG.1.



Heating water.—In a feed-water supply regulator, the operative parts which are wholly enclosed within the boiler shell, a rolling weight device suspended from the steam pipe 5 actuates, through link-work, a valve 7 controlling the supply of steam to a water delivery device. A float 21 gives the necessary inclination to the tube 24 to cause the weight 29 to roll and operate the valve suddenly at the limits of high and low water.

10,607. Hopkinson, A. H., Kilburn, B., and **Hopkinson & Co., J.** May 7.

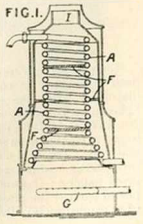
FIG.1. FIG.2.



Steam traps.—A steam trap, with valve actuated by an expansible fluid, is constructed to work under varying pressures and temperatures of steam. The valve is divided into two parts, the upper part *a* which carries the valve seat *b* being screwed into the steam chamber or pipe, and the lower part *g* carrying the valve *l* being connected flexibly to the upper part by the spring *e* held in the lugs *d*, *f*. The valve *h* is mounted on a sliding rod *k* which extends into the chamber *g* containing the expansible fluid, actual contact with which is prevented by the flexible tube *m*. The valve can be adjusted towards or away from its seat by turning the part *g* or the part *a* in the spring *e*. Screws *p* serve to lock the parts in position when adjusted. The spring *e* is sufficiently strong to withstand the full pressure of the steam on the valve without yielding, but yields under the forces brought into play by the differential expansion of the fluid and the parts of the trap. A cylindrical extension *q* may be fitted to the valve seat, thus directing the steam &c. over the chamber *g* and causing the valve to operate quickly. In modified constructions, the parts are connected by a pair of springs acting through yokes, or the part *d* is extended downwards so as to form a casing enclosing the part *f* and the spring.

10,850. Winterflood, J. F. May 9.

FIG.1.

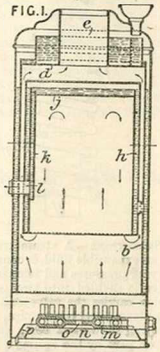


Heating water.—In a water-heater or geyser in which the water passes through a coil of piping A terminating at its base in the form of a cone, hemisphere, or the like, baffles F are arranged both within the coil, between it and the surrounding casing, so that the products of combustion from the burner G travel in a circuitous manner on their way to the outlet I. The apparatus may have a flat or a coned top.

10,867. Ewart & Son, and **Ewart, G. H.** May 9.

Heating water.—In a geyser of the sealed type, the water enters an annular space *d* surrounding the vent pipe *e* from which it overflows into a jacket *b* around the casing. The water then passes into an annular chamber *h* formed of two concentric cylinders, the inner of which is open at the bottom but closed at the top. The outer cylinder is also closed at the top, and the space between the two covers forms a tray *j* into which the water flows from the annular chamber. A pipe *k* conveys the water thence to the outlet *l*. To increase the draught, the burner is in the form of a ring having in the central space a web *n* provided with an opening *o*. The condensation gutter *p* is arranged below the burner so as to form an annular space around it.

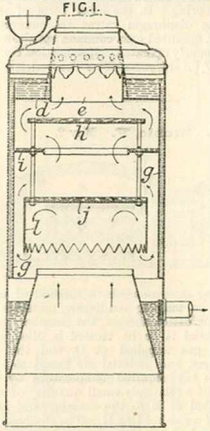
FIG. 1.



10,868. Ewart & Son, and **Ewart, G. H.** May 9.

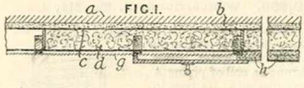
Heating water.—In a geyser of the open type in which the water falls successively on central and peripheral trays *h*, *j*, so as to pursue a zigzag path in a direction opposite to that of the heating-gases, the topmost tray *d* surrounds the flue *e*, which is provided with holes or has its upper surface scalloped so that water overflows on to the lower trays. The central trays are carried by rods secured to, and projecting upwardly and downwardly from, the peripheral tray. The heated water finally flows down the sides of a screen *l* attached to the bottom of the dish *j* into the bottom of the apparatus. A water jacket *g* opening at the top into the tray *d* may also be provided.

FIG. 1.



11,045. Mackay, F. N. May 11.

FIG. 1.



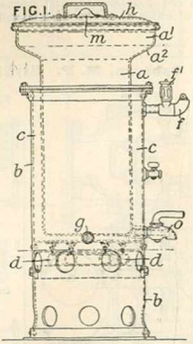
Non-conducting coverings and compositions.—The dead air spaces of cold-storage chambers &c. are dispensed with, the spaces being filled by 'cork 'plastic,' a composition described in Specification No. 1978, A.D. 1904, either alone or as an insulating-course in combination with other layers of insulating-material. The wall *a* is first coated with a layer of cork plastic *b* which is preferably covered by waterproof paper *c*; slagwool or similar material is then placed against the plastic as a filling *d*; a casing *g* of expanded metal filled in with cork plastic *h* holds the slagwool in place, and timber sheeting or other suitable material forms the final casing. A combination of slagwool and granular material preferably disposed in bags may be used for the filling, and cork plastic may also be added to the material, thus enabling the bags to become moulded to the space they fill.

11,089. Longsdon, H. C., and **Mahon, J. L.** May 13.

Boiling-pans.—A jacketed pan *a* for preparing starch for laundry purposes has its upper part a^1 enlarged with the formation of a shoulder a^2 so that the film, which forms on the top of the boiling starch, can rise above this shoulder and allow steam &c. beneath to escape without raising the lid *h* or boiling over. The jacketing cavity *c* formed by an

outer pan *b* is provided with a pipe *f* for admitting steam or water for heating the contents of the inner pen *a*, a steam safety-valve *f*¹, and a valve *g* for drawing off excess of accumulated water

FIG. 1.

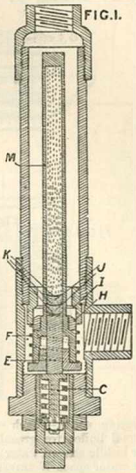


When water is supplied to the outer pan *b*, it is heated by gas burners *d* or otherwise. Steam may be supplied to heat and agitate the contents of the pan *a* by a perforated pipe therein, and a tap *o* enables the contents to be withdrawn. The lid *h* fits the upper part *a*¹ firmly and has a small covering *m* which slides from over an opening to allow vapour to escape when desired. A safety-valve in the lid may be substituted for this device.

11,312. Horne, A. D. May 15.

Steam traps.—Gutta-percha or like material contained within a cylinder M expands when steam passes through the trap, thereby forcing the cylinder upwards from a piston E and bringing a valve H, which is rigidly connected to the cylinder, tightly on to its seat I. Packing consisting of metallic cups K separated by layers J of asbestos prevents the escape of the expansive material; in addition, the piston E is provided with a stuffing-box. A light spring F aids the pressure of the steam to lift the valve off its seat when the gutta-percha contracts. Over-actuation is prevented by a strong adjustable spring C which takes up any movement of the piston, after the valve has closed, due to excessive expansion of the gutta-percha.

FIG. 1.

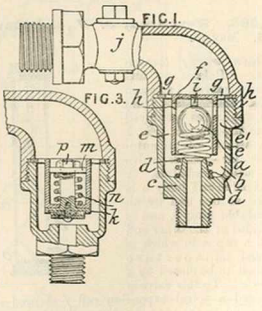


11,435. Patterson, F. H. May 16.

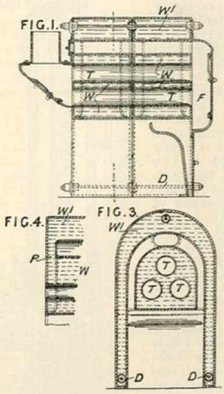
Steam traps.—Relates to that type of automatic drain valves for steam cylinders, steam chests, steam pipes, &c. which are opened by spring influence and close under the pressure of the steam. The ball valve *a*, Fig. 1, is normally kept raised by the spring *d*, which may be adjustable by being screwed on a threaded collar on the seating or otherwise. When the condensation water has been expelled by way of apertures *g* in a plate *f*, which closes the top of the cylinder *e* and is provided with a stud *i*, the space *e*¹, and through the seat *c*, the steam passes through apertures *h* into the cylinder *e* and forces the ball *a* on its seat *c*. The ball *a* remains held down so long as the steam acts on it. When the plug cock *j* is closed, the lower part *b* of the casing may be unscrewed for renewal or repairs. In a modification, Fig. 3, a disk valve *k*, preferably fitted with a disk of woodite &c., below which is a plate of copper or other metal, is raised by a spring *n*, adjustable by a nut *p*, and is closed by the steam pressure acting on the piston *m*.

FIG. 1.

FIG. 3.

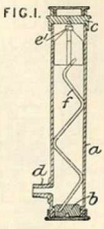


11,446. Binns, V. May 16.



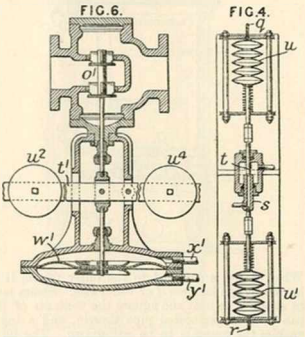
Heating water.—Each section of a wrought-iron sectional boiler for greenhouses &c. consists of an outer saddle-shaped water space W¹, Fig. 3, and an inner water space W traversed by fire-tubes T; the two water spaces communicate with each other through spaces P, Fig. 4, at the sides or ends of the section. Fig. 1 shows a boiler composed of two sections connected together by long bolts D. The furnace gases reach the tubes T through a smoke-box F at the back.

11,588. Westwood, J. W., and **Barter, C.** May 17.



Steam traps; thermostats. — Relates to air-release valves, steam traps, thermostats, and like appliances employed in heating-systems. Fig. 1 is a section of an automatic air release valve for steam radiators. A cylindrical body *a* is closed at one end by an adjustable plug *b*, and is provided at the other end with a cap *c*, in which is formed an aperture adapted to be closed by a valve e^1. To this valve is fastened a spiral expansion rod *f* secured at its lower end to the plug *b*. Normally, the valve e^1 is held away from its seat, but, as it becomes heated by steam entering the inlet *d*, it closes the aperture in the cap *c* owing to the expansion of the rod *f*. When applied to steam traps, the valve is lowermost and the automatic operation of the trap is effected in the usual cycle, the valve being closed when the rod *f* is heated, and opened for the discharge of water when the rod is cooled.

11,778. Osbourn, M. P. May 21.



Heating buildings &c.; heating by steam circulation; thermostats &c. — The supply of steam to systems for heating buildings or for other purposes is automatically controlled according to the combined variations of the external atmospheric temperature and the temperature or pressure in the steam-supply main. The control is effected by varying the amount of steam abstracted from the supply main by a condenser. In the arrangement shown in Fig. 1, the exhaust pipe B^1 of the engine B is connected to the condenser G by a pipe C^1, and to the heating-system A by a main C. A valve J in the pipe C^1 is controlled simultaneously by a thermostat N outside the building and a thermostat O in the supply main C. The thermostats are of the expansible liquid type, and are in communication with bellows *u*, u^1 by pipes *q*, *r*, respectively. The bellows *u* carries an adjustable valve *t*, Fig. 4, co-operating with a seat *s* attached to the bellows u^1. The valve regulates the flow of water under pressure from an accumulator L to a chamber J^1 containing a diaphragm controlling the valve J; the accumulator is supplied by a pump K from a cistern P. The arrangement is such that the greater the external temperature or the temperature of the exhaust steam, the greater will be the opening of the valve J, so that more steam passes to the condenser and consequently less flows to the heating system. The thermostat O may be replaced by a device subject to variations of pressure in the main C. In a modification, the valve J regulates the effectiveness of the condenser by

(*For Figs. 1 & 3 see next page.*)

11,778.

FIG. 1.

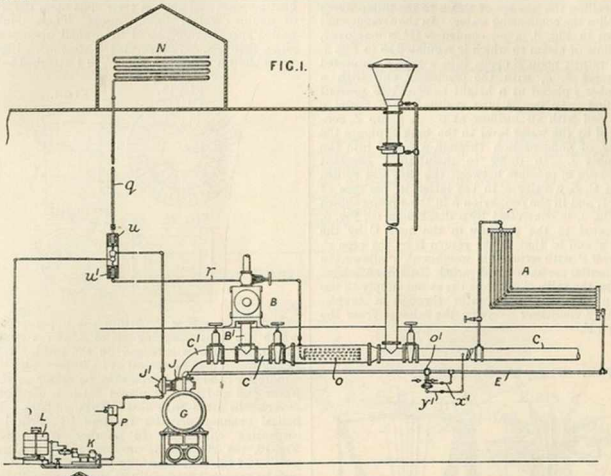
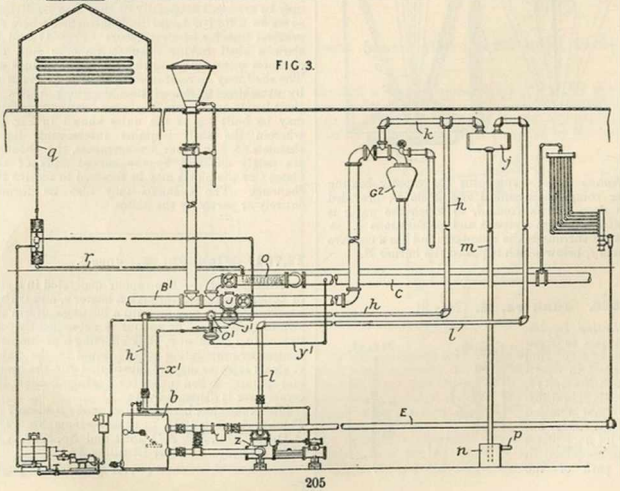
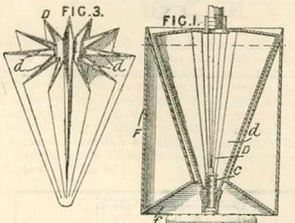


FIG 3.



controlling the passage of steam to the pump which supplies the condensing water. In the arrangement shown in Fig. 3, a jet condenser G^2 is employed, the flow of steam to which is regulated as in Fig. 1. The return main E opens into a tank *b* connected by pipes *h*, *k*, with the condenser and with a chamber *j* placed at a height sufficient to prevent flooding. An escape pipe *m* dips into a vessel *n* provided with an outflow at *p*. A pump Z, controlled by the water level in the tank *b*, pumps the water of condensation through a pipe *l* into the chamber *j*. In order to maintain a constant difference in pressure between the flow and return pipes C, E, a valve o^1 in the latter, in the case of Fig. 1, and in the connexion *h* in the system shown in Fig. 3, is controlled by a diaphragm w^1, Fig. 6, subjected to the pressure in the main C by the pipe y^1 and to that in the return E by the pipe x^1. A lever t^1 with adjustable weights u^2, u^4 allows the differential pressure to be varied. In other arrangements, the valve o^1 controls the steam supply to the pump passing cooling-water through a supplementary condenser receiving the exhaust from the return E.

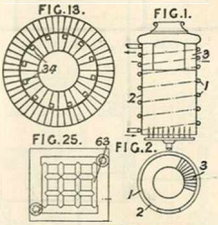
11,781. Olds, P. G. May 21.



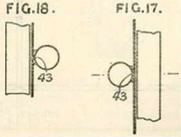
Heating water.—Apparatus for rapidly heating water comprises a conical receptacle D, provided with deep narrow folds *d*, to which the water is admitted through a pipe A and perforations *c*. A casing F surrounds the receptacle and has a concave bottom *f*, below which is placed the burner B.

12,626. Junkers, H. May 31.

Heating liquids.—Relates to apparatus of the kind described in Specification No. 13,113, A.D. 1902, in which the liquid is heated through heat absorbing plates which are placed in the path of the heating-gases and abut at their ends upon the walls of double walled liquid spaces. These double-walled spaces are replaced by a shell upon which pipes, channels, &c. are formed or attached. Figs. 1 and 2 show a helically wound pipe 1 attached to the



outside of a casing 2, within the upper part of which are heat-absorbing plates 3. In a modification, the pipe is arranged on the inside of the casing which may be conical at its lower end. The windings of the coiled pipe may be closer at their upper end and may be placed between concentric cover shells fitted with heat-absorbing plates. The helical channel may be replaced by vertical or serpentine channels. In another arrangement, Fig. 13, the channels 34 are formed by shaping a portion of the heat-absorbing plates. The channels may be arranged diagonally or they may be divided so as to afford a larger heating-surface where the greatest transfer of heat occurs. Figs. 17 and 18 show a shell having channels on each side, the channels communicating through the openings 43. The shell may be reinforced by a strip of metal or by attaching U-shaped heat-absorbing plates at their bends to the shell. Large heating-apparatus may be built up of the units shown in Fig. 25 wherein the shell contains intersecting liquid channels 63. In other arrangements, the channels are partly enclosed by the curved ends of the plates; or the plates may be recessed to receive the channels. The channels may also be formed entirely or partly by the plates.



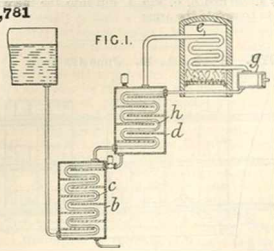
12,781. Planckh, R. June 3.

Heating liquids.—The vapour generated in a still or boiler *d* is passed through a heater *e*, and is then compressed by a pump *g* into a heating-coil *h* in the still or boiler *d*. The vapour is subsequently condensed in a chamber *b*, thus effecting a preliminary heating or evaporation of the liquid in the coil *c*. A steam injector may be substituted for the heater and pump. When used for heating liquids, the compressor is dispensed with.

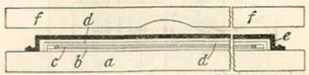
[Reference has been directed under Section 7 of Patents &c. Act, 1907, to Specifications No. 1930, A.D. 1867, No. 333, A.D. 1890, and No. 3080, A.D. 1900, [*Abridgment Class* Distilling &c.].]

(*For Figure see next page.*)

12,781



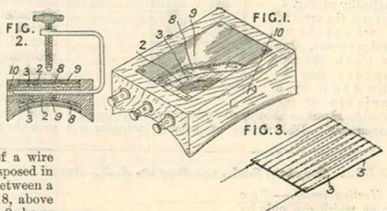
12,826. Thaller, A. N. June 3.



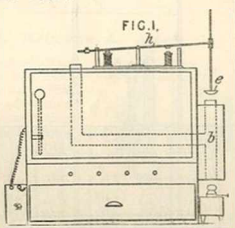
Heating by electricity.—A trouser press, comprising the two boards *a*, *f*, fitted with the usual pressure-obtaining bolts, thumb-screws, &c., is provided with electric heating means, consisting of two sheets *b*, *d*, of asbestos or the like, enclosing a resistance *c*, and surrounded by a flanged metal plate *e*.

12,871. Gornall, F. J., and **Union Rubber and Chemical Co.** June 4.

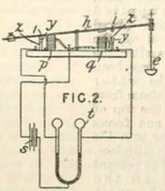
Heating by electricity.—In an electrically-heated vulcanizer the heating-coil is disposed as far as possible in the form of a superficies located immediately below the vulcanizing-plate, which is so mounted in the non-conducting material forming the main casing of the vulcanizer that this casing prevents the heat generated from being dissipated in any other direction than through the vulcanizing-plate. The heating-coil 3, Figs. 1, 2, and 3, consists of a wire wound over a sheet of mica 5, which is disposed in a wooden or other non-conducting casing between a layer of asbestos 2 and a sheet of mica 8, above which is situated the heating-plate 9. Fig. 2 shows a section of a vulcanizer having two vulcanizing-elements, between which is a slot 10 for holding a clamp.



12,941. Thompson, A., and **Thompson, C. E.** June 4.

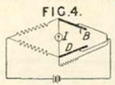


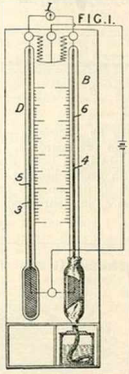
Thermostats.—In apparatus for maintaining constant the temperature of an incubator, greenhouse, or the like, the damper *c*, controlling the direct outflow of the products of combustion from the chimney *b*, is carried by a balanced lever *h* actuated by one or other of two electro-magnets *p*, *q*, connected with the battery *s* and with the maximum and minimum temperature terminals of a thermometer *t*. Each of the two circuits is completed through a pair of spring arms *y*, *z*, which are so arranged that when one magnet is excited the adjacent pair of arms is separated by the consequent insertion of an insulating-piece 1 carried by the lever.



This cut-out device may be reversely arranged, the arms being normally out of contact but in electric connexion through the pieces 1, which are made of conducting-material and are withdrawn to break circuit when the lever is operated. Other forms of thermometer than that shown may be employed, for example, a bimetallic strip arranged to dip a contact into one or other of two mercury cups when the temperature limits are reached

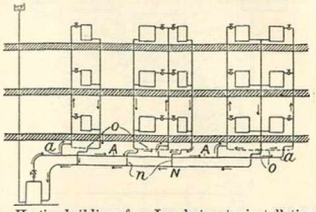
12,945. Cramer, S. W. June 4.





Thermostats.—Relates to improvements on the apparatus described in Specification No. 1769, A.D. 1906. Wet and dry bulb mercury thermometers E, D, or two metallic or like thermometers, are arranged as shown diagrammatically in Fig. 4, to form the arms of a wheatstone bridge circuit. One or both thermometers may be shunted by a variable or invariable shunt as shown, so as to vary the scale of movements. Disturbance of balance actuates a relay I. Wires 5, 6, Fig. 1, dip into the mercury 3, 4, to complete the arms.

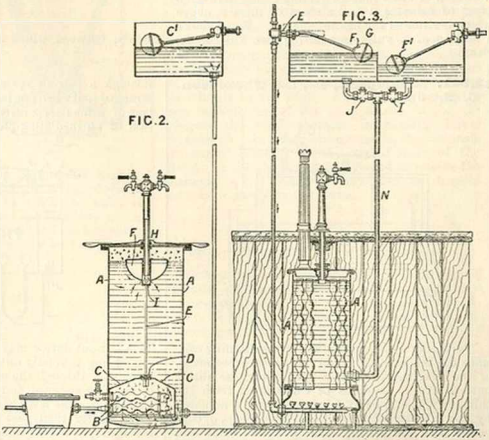
12,976. Reck, A. B. June 4.



Heating buildings &c.—In a hot-water installation wherein water, owing to differences of temperature, circulates in groups of radiators separately connected with the main flow and return pipes, a local circuit is established in some or all of the groups by providing pipes *o* which lead cooled water from any point of the branch pipes *n* connecting the group with the main return pipe N, or from a point in the main pipe N near the junction with the branch pipes *n*, to the branch pipes *a* connecting the groups with the main flow pipe A.

13,082. Royles, Ltd., and **Royle, J. J.** June 6.

Heating water.—The water, which can only be withdrawn when actually boiling, is contained in a casing A and is heated by a steam heater B of the type described in Specification No. 15,192, A.D. 1891, *Abridgment Class* Steam generators &c.]. Water is supplied from a cistern placed above the level of the heater. When, after the steam supply has been turned on, the water begins to boil, steam from it collects at the top of the casing A and forces back the water into the cistern. This displacement is caused to prevent over-boiling. In the arrangement shown in Fig. 2, a water-delivery pipe H extends a little way within the casing A, and is there surrounded by an annular float F, which carries a valve I normally pressing on a seat at the extremity of the pipe H and thus closing it. A spindle E is attached to this valve and

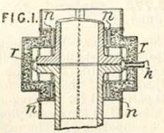


at its lower extremity carries a second valve D, which generally is held a little above its seat in a hood C over the steam heater; but when the water is boiling so as to produce steam in the casing A, the float F sinks, thus opening the delivery pipe H and permitting the withdrawal of the boiling water. Should no water be withdrawn for some time, the further sinking of the float presses the valve D against its seat and thus traps the steam in the hood C. The pressure of the steam within the hood then forces back the water from the heater, preventing the wasteful boiling of the water. A second hood similar to C may be situated over the float F. In an alternative arrangement, shown in Fig. 3, the supply of gas or steam to a heater is controlled by the displacement of the water. The casing A is connected to a double cistern G, containing ball-taps F, F^1 controlling the gas and water supplies respectively, by an inlet pipe N separately connected to each half of the cistern G by means of pipes J, I. Non-return valves are fitted in these pipes so that water will readily flow down through the pipe I or up through the pipe J, but the valves fit loosely and permit the water to leak through the pipes. When the water boils, the steam forces water up the pipe N past the valve J into that half of the cistern, and by lifting the ball valve decreases the supply of gas or steam. When hot water is withdrawn, the deficiency is made up at first from the cistern containing the valve F, the greater head of water in this cistern causing a rapid leaking past the valve J. The gas supply is thus increased. As more water is withdrawn, the water in the two cisterns becomes more nearly level and a larger amount of water flows from the cistern containing the ball valve F^1, thus opening the water supply from the main. The arrangement may be adapted for heating by ordinary fuel, a damper being controlled by the displacement of the water by steam. The float in the water chamber for preventing the withdrawal of water till actually boiling may also be fitted in the modification.

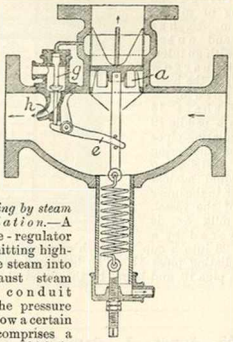
13,179. Reimann, A. June 6.

Non-conducting coverings and compositions.—The insulating-layers of a non conducting covering for flange joints on pipes are held in place on the inner face of the casing by means of wire basket-work *n* which is attached to the casing. The non-conducting covering is hinged to allow of ready removal, pins serving to keep it normally closed on the pipe. A semicircular channel *r* round the flange under the wirework leads steam or other fluid escaping by reason of a defective joint to the pipe *k* which carries it off, thus furnishing an indication of the leakage.

FIG. 1.



13,244. Klauser, H. O., [*Scheer & Co. Armaturenfabrik & Metallgiesserei, C. F.*]. June 7.

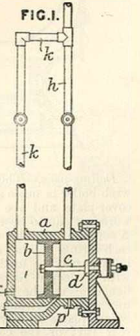


Heating by steam circulation.—A pressure-regulator for admitting high-pressure steam into an exhaust steam heating conduit when the pressure falls below a certain value comprises a valve *g* which is operated through a lever *e* from the valve piston *a*. When the pressure falls, the valve *g* is opened and supplies live steam through a nozzle *h* which is curved in the direction of flow so as not to impede the passage of the exhaust steam.

13,319. Gover, E. W., [*Buck, E. C.*]. June 8.

Steam traps.—In a steam trap actuated by the head of condensation water, a vertical pipe *h* directly communicating with the main steam-pipe leads the condensation water into the cylinder *a*. A pipe *k* communicating with the other end of the cylinder is connected, at right-angles, with the pipe *h*. The pressure on the dry side of the piston *b* is greater than that on the other side by an amount proportional to the area of cross-section of the piston-rod *c*, so that the piston is forced forwards until the stop *d* comes into play, thus covering the water outlet *o*. When the pressure due to the head of water in the cylinder and the pipe becomes greater than this extra pressure, the piston is forced back and the water escapes through a passage *o*. Cocks &c. are fitted on the pipes *h*, *k* and to the openings *r*, *p*.

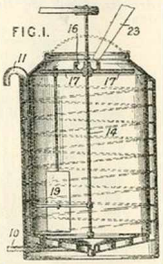
FIG. 1.



13,332. Lawrence, Z. S. June 8.

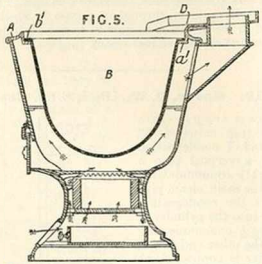
Heating liquids.—A vessel for the storage and heating of milk, cream, &c. has inner and outer walls with an intermediate narrow space for the heating-medium. A rotary shaft 14 carries a paddle 19 and radiating pipes 17 for delivering and distributing the liquid against or near to the inner wall of the vessel. The milk &c. is delivered by a spout 23 into a cup 16 which communicates with the radiating pipes 17. The heating-liquid enters by the pipe 10, and leaves by the outlet 11.

FIG.1.



13,558. Jones, J., Campbell, D., and **Galloway, R.** June 12.

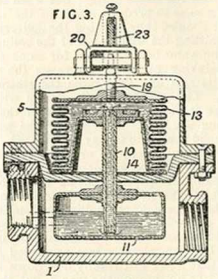
FIG.5.



Boiling-pans.—The furnace pan of a portable wash-boiler is made separate from the annular flue cover-plate and the outer casing, thus allowing a worn-out pan to be readily replaced by a new one. A series of annular cover-plates may be made for each casing, so that any desired standard size boiling-pan may be used. The cover-plate A is made with a deeply recessed flange a^1, upon which a flange b^1 on the boiling-pan B rests, or to the underside of which it is attached by screws. Splash-plates D may be cut with or affixed to the rear part of the cover-plates. These plates are shaped to fit the rings A and also to be in alinement with the wall or walls of the building. The plates D are preferably made to slope inward towards the pan.

13,635. Marks, E. C. R., [*Fulton Co.*]. June 13.

FIG.3.

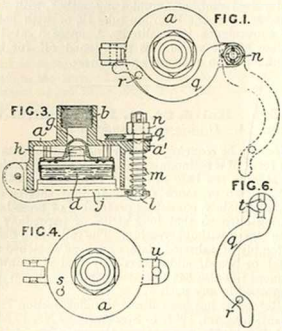


Thermostats.—Relates to that type of apparatus for automatically regulating temperature, in which the variations in pressure of the saturated vapour of a volatile liquid, due to changes in temperature, are transmitted to the same or another liquid contained in a collapsible vessel. In the construction shown, as applied to a hot-water circulating boiler, the chamber 1 communicating with the flow and return pipes of the boiler contains a receptacle 11 partly filled with a volatile liquid, for example chloroform, and in communication, through a stand pipe 10, with a collapsible vessel 13, the top of which carries a rod 19 secured to a rocker 20 carrying the damper lever 23. A compensating-device connected to the rocker comprises a spring-pressed plunger in a pivoted cylinder. The collapsible vessel is maintained comparatively cool by arranging a dead air space 14 to retard transmission of heat from chamber 1, and also by forming the bell cover 5 of thin metal to facilitate radiation

13,772. Cleland, J., and **Stewart, J. C.** June 14.

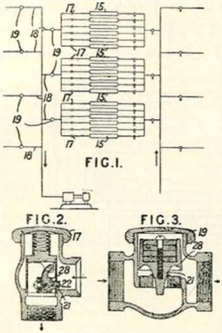
Steam traps.—In a steam trap comprising an expansible metallic vessel filled with highly expansive or volatile liquid, provision is made for the adjustment of the valve, for easy disconnexion of the parts, and for blowing-off. The outer casing a is attached to the steam-pipe or the like by means of a connexion b. The expansion vessel d is supported by a lever j, which is pivoted at one end to the casing a and is secured at the other by a square neck bolt l which passes through the lug a^1 of the casing. The valve g rests upon the vessel d and is held centrally by a pin h. The vessel d is maintained at a proper height in the casing by adjusting a nut n on the bolt l. A spring m keeps the lever j as far out as possible, and at the same time enables the valve to work well under vibration or under different pressures of steam. A hand release is arranged by a lever q, which is fastened under the

nut n and is usually held in the locked position by a projection r fitting in a recess s in the casing. A projection t on the underside of the lever near the



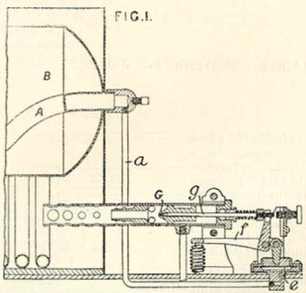
pivot is in this case at right-angles to a corresponding recess u in the casing a. When the lever is turned to the dotted line position, the projection falls into the recess, the lever and valve fall, and steam blows through.

13,808. Donnelly, J. A. June 14.



Heating buildings &c.; heating by steam circulation; steam traps.—To effect the removal of the air and water of condensation in a steam heating system, weighted check valves 17, 19, which may be those shown in Figs. 2 and 3, are fitted in the discharge pipes from the radiators 15, and in the branch return 18, so as to maintain a constant flow of steam from the radiators. Specification No. 21,898, A.D 1904, is referred to. The valve device 19 consists of a weighted valve 21 enclosed in a casing having an inlet and outlet, as shown. The valve device or trap 17 is similar, but the valve is hinged to a separate inner casing 22. The valve 21 is conical so that as the valve opens the passage for the fluid is correspondingly increased, the opening thus increasing as the difference of pressure between the two sides of the valve increases. Each valve may be provided with an impact surface 28 to aid the removal of the water of condensation. A leakage may also be provided to permit the escape of air or water when the apparatus is starting or not working. The valves 17, 19 are weighted so as to open only when certain differences of pressure exist on each side of the valves. A constant difference of pressure is thus maintained, causing an even flow. The valves also open under the head of accumulated water of condensation, thus serving as traps.

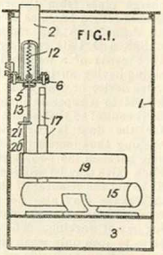
14,198. Maxim, Sir H. S. June 19.



Thermostats.—In steam-generators for vacuum cleaning-apparatus in which the vacuum is produced by a steam jet, means are provided for cutting off the fuel supply when the steam-generator reaches a certain temperature. In the boiler B is placed a tube A brazed to the end of the boiler and containing water or other suitable liquid. The tube A communicates by a pipe a with the underside of a diaphragm e, which controls through a lever f &c. the needle valve g of the gas orifice G.

14,290. Newbery, G. M., and **British Prometheus Co.** June 20. *No Patent granted* (*Sealing fee not paid*).

Heating gases; heating liquids; thermostats.—The invention is shown as applied to an apparatus for electrically heating water and maintaining a supply at a constant temperature by admitting cooler water when this temperature is exceeded, but it is applicable for other heating and cooling apparatus for liquids and gases. The cold-water supply pipe 2 is normally closed by a cup-shaped valve 5, pressed against a plate 6 by a tension spring 12; or the valve may be a plate pressed against the free edge of the inlet pipe. The valve is arranged to be tilted by the engagement of a hook 21 at the end of the valve-rod 13 with a vertical rod 20 carried by a Bourdon tube 19. The edge of the hole in the plate 6 is formed with knife-edges to form a fulcrum, and either the edge of the hole, or the rod 13, is fluted to allow of the passage of the water. The Bourdon tube 19 is connected to a chamber 15 containing water or other liquid, a tube 17, preferably decreasing to a small diameter at its free end, communicating either with the chamber 15 or the Bourdon tube 19, or with both, for convenience in sealing. A space 3 at the bottom of the vessel 1 is partitioned off for the accommodation of heating-resistances.



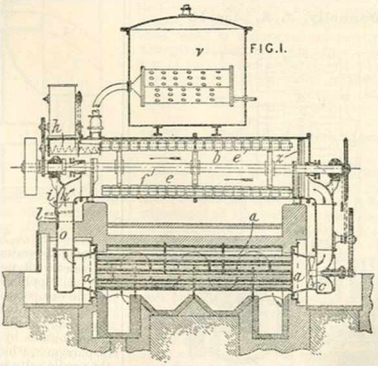
14,505. Hall & Co., B. J., and **Hall, B. J.** June 24. *Drawings to Specification.*

Heating by electricity.—A drying-oven consists in one form of a rectangular metal box having electric radiators in the base which are covered by a baffle-plate. Two or more non-conducting shelves are used alternately, consisting preferably of cross-bars bearing clips so that long strips of paper may be hung zigzag without creasing. The full-width door, preferably of asbestos, slate, or canvas stretched on metal or wood, slides vertically and is counter-balanced; it also has a vertical handle so that it can be grasped in any position.

[Reference has been directed under Section 7 of Patents &c. Act, 1907, to Specifications No. 19,323, A.D. 1897, [*Abridgment Class* Drying], No. 24,413, A.D. 1899, [*Abridgment Class* Stoves &c.], and Nos. 3476, 10,124, and 23,354, A.D. 1901, [*Abridgment Class* Drying].]

14,528. Volland, A. June 24.

Heating by steam circulation.—In a drying apparatus, the heat introduced to the material to be dried causes the formation of steam, which is continuously circulated through a superheater *a* and back to the drying-drum *b* by a fan *c*. Excess steam may be led off and utilized for heating and drying, for example, in a chamber *v*.



14,688. Newberry, F. J. June 25.

Boiling-pans.—A frame for a copper consists of an upper cup-shaped portion A in which the copper is hung, and a similarly-shaped but inverted part B supporting a fire-grate C. The grate is supported upon a dished ring E, which is cut away at L to pass over the lugs H when assembling the parts, and is flattened opposite the doorway to support fuel in the form of billets of wood. The door F is hinged at its lower edge and, when opened, rests upon a projection J.

FIG. 3.

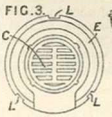
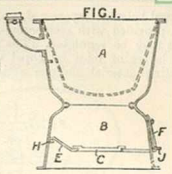


FIG. 1.



14,715. Jackson, C. L. Rothwell-, and **Jackson, H. L. Rothwell-.** June 26.

Heating liquids.—A heating-apparatus is placed between the pump and the kier in bleaching &c. apparatus of the type described in Specification No. 5409, A.D. 1900, [*Abridgment Class* Bleaching &c.], in order to heat the liquor circulating through the kier without diluting it, as is done when heated by steam injection. In the form shown in Fig. 2, the liquor is passed by a pump *f* through tubes *h* surrounded by steam, which enters at *i* and leaves at *j*. The tube *k* conveys the heated liquid to the kier. In a modification shown in Fig. 3, the liquor is pumped through the casing *g*, where it is heated by coils *l*, through which steam is passed, the liquor then being conveyed to the kier as before.

FIG. 2.

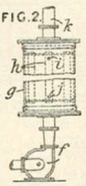
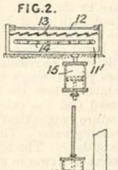


FIG. 3.

14,745. Fessenden, R. A. June 26.

Solar heat, utilizing.—Solar heat is utilized to drive a hot-air engine which works a pump for raising water from a low to an extra high-level reservoir. A chamber 11^1 provided with a transparent cover 12, pivoted shutters 13, and cooling tubes 14, is connected to the hot-air engine 15 which drives the pump 16. On opening the shutters 13, the solar heat causes expansion of the contained air, which thereby forces down the pistons of the engine and pump. The shutters are then closed by the agency of the engine if desired, and cooling liquid circulated through the tubes 14, causing contraction of the contained air and consequent rising of the engine and pump pistons.

FIG. 2.



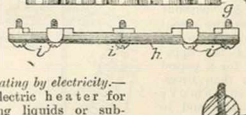
14,747. Krautschneider, H. June 29, 1906, [*date applied for under Patents Act, 1901*].

Heating liquids.—A tempering-bath is heated electrically by means of resistances placed in the liquid constituting the bath. The current is passed through wires or strips *b*, and is controlled by an external resistance or by making the resistance *b* adjustable.

FIG. 1.

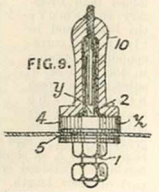
15,079. Adlard, W. S. July 1.

FIG. 1.

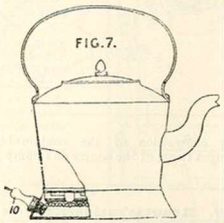


Heating by electricity.—An electric heater for heating liquids or substances, for boiling, cooking, and sterilizing, for heating tailors' smoothing, pressing, and goffering irons, and for use in kettles, food-warmers, and humidifiers for spinning and weaving machinery, and for ventilating, consists of a coiled resistance wire arranged in one or more layers *a*, *b* and

FIG. 9.



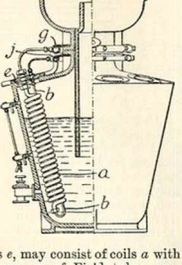
pressed between layers *c*, *d*, *e* of mica by plates *f*, *g* and provided with connecting-screws, so that the heat may be regulated. The wire is attached to the layers of mica by copal varnish or other insulating-material, and one section of the wire series,



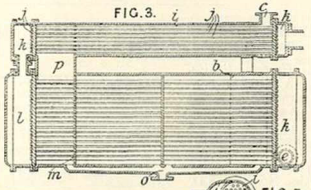
if required, as an auxiliary resistance, the ends being connected to contact plates *k*, *l*, *m*. Contact screws are secured to steatite brushes or plugs screwed into the lower plate *g*. A frame *h* having radiating arms is secured to the upper and lower plates by screws *i*. In Fig. 7 is shown a heater of this type used with a kettle, having handles 10 for connexion to a source of supply. Each handle, Fig. 9, has a collar *z* with two projecting stems 1, 2 insulated by washers 4, 5 from the frame of the kettle, and connected to one end of the wire and to the handle 10.

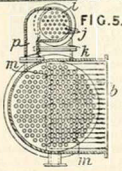
15,164. Halket, J. P. July 1.

Heating liquids.—An evaporator, feed-water heater, or the like contains a number of heaters any one of which may be separately removed for cleaning &c. without causing the cessation of the working of the apparatus for a period longer than necessary to remove the heater and to close the corresponding opening in the shell or to substitute a fresh heater. The heaters, which are either singly or in groups secured to caps *e*, may consist of coils *a* with return tubes *b*, as shown, or of Field tubes, preferably of flattened cross-section for the greater part of their length. Common steam and drain pipes *g*, *j* are connected to each heater by separate pipes, which are plugged when the corresponding heater is removed. When a group of Field tubes is connected to a cap to form one heater, passages are framed in the cap and the tubes are secured by means of plugs with openings leading to these passages, thus providing communication between each tube and the supply and the drain pipe. The Field tubes may be formed with a slight spiral so that their expansion causes an automatic sealing to take place.



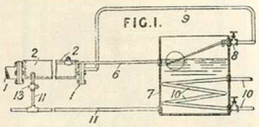
15,186. Thomas, P. July 2.





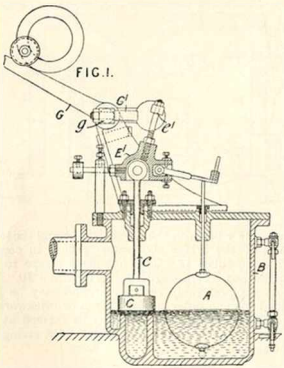
Heating liquids.—A condenser, which may also be used for heating liquids by steam, is made in two divisions, one serving to condense the steam and the other to cool the air and non-condensible gases that enter the condenser with the steam. The cooling-water enters the upper header *k*, passes through the tubes *j* in the upper chamber *i* of the condenser to the header *l* connecting the upper and lower chamber, thence flows through the tubes in the lower chamber, and is finally withdrawn through the outlet *e* in the header at the further end of this chamber. The steam entering at an inlet *b* passes between the tubes in the opposite direction to that taken by the water. Baffles *m*, *m* cause it to take a zigzag path as it travels through the condenser. The greater portion of the steam is condensed in the lower chamber and is withdrawn through the outlet *o*. The remaining steam and non-condensible gases pass through the opening *p* into the upper chamber, where the last traces of steam are condensed and the other gases are cooled to a temperature approximately equal to that of the incoming water. These gases then escape through the outlet *c*. The tubes in the upper chamber are preferably fewer in number and smaller in diameter than those in the lower in order to cause a more rapid flow of water through this chamber. The steam inlet opening is made the full depth of the lower division of the condenser, thus keeping the uppermost and lowest tubes of this chamber at the same temperature. The two chambers may be separate or enclosed within one casing.

15,188. Griffiths, J. A., and **Griffiths, E.** July 2.

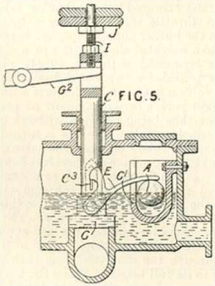


Heating buildings. — Open troughs 2, supported on pipes 1 of a heating system, contain water, which is kept at a constant level by a ball tap 8 in a cistern 7, a supply of hot water being thus obtained. The troughs are preferably made saddle-shaped, and are held in position by lugs at their extremities fitting over flange bolts at the junctions of the pipes; or, in the case of spigot joints, by lugs on each side carrying pinch screws. The troughs may be cast integral with the pipes. When the pipes are heated by hot water, the ball tap 8 may be connected by a pipe 9 to the hot-water supply. When the pipes are heated by steam, the supply of water may be heated by steam from a boiler or from the heating-pipes; or a heating-coil 10 may be fitted within the cistern. Circulating-pipes 11 communicating through cocks 13 with the troughs may be fitted, so that a constant circulation is kept up through the pipes 11, troughs 2, cistern 7, and supply pipe 6. The cistern may be saddle-shaped to fit over the heating-pipes.

15,194. White, J. July 2.



Steam traps.—The water, discharged from the drying-cylinders of paper-making machines &c., in the manner described in Specification No. 4174, A.D. 1904, [*Abridgment Class* Paper &c.], is removed from the chamber B, Fig. 1, through a discharge valve C automatically controlled by a float A. Pivoted on the end of a rod *c*



attached to the valve, is a block E^1 carrying an adjustable catch pin e^1 and a pivoted lever E. The lever operated by a rod is attached to the float A to move the catch-pin e^1 into the path of a lever G^1 which is mounted on a shaft *g* and reciprocated by a crank-pin fixed on the end of one of the drying-cylinders or other suitable moving part and acting on a lever G. The lever G^1 thus raises the valve C and allows the water to escape. A signal indicating that the valve C is in motion may be attached to the catch-pin e^1 by a chain. In a modification shown in Fig. 5, the lever E is pivotally mounted on the valve C inside the chamber and operated by direct contact with the float A. The valve spindle C is actuated by the lever G^2 and is free to move without lifting the valve C. As the float rises, it lifts a part of the lever E into engagement with a pin or projection c^3 on the spindle *c* and causes this to lift the valve. The lift of the spindle is adjusted by a screw I, and weights J assist its fall. The water to raise the float may be caused to pass over a partition C^1.

15,257. Schmidt, O. July 2. *Drawings to Specification.*

Boiling-pans.—In an apparatus for boiling easily foaming or frothing substances, such as resin in the production of resin size, apparatus is provided for cooling the rising substances consisting of coils, which are cooled by liquid, and may be raised or lowered by means of a supporting chain. The coils are not in contact with each other and lie, at least partly, one above the other. The resin or other substance is heated by steam coils at the bottom of the vessel.

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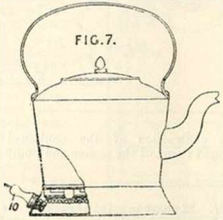
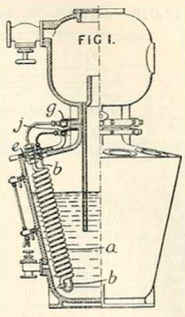
pressed between layers *c*, *d*, *e* of mica by plates *f*, *g* and provided with connecting-screws, so that the heat may be regulated. The wire is attached to the layers of mica by copal varnish or other insulating-material, and one section of the wire series,



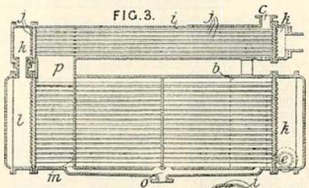
if required, as an auxiliary resistance, the ends being connected to contact plates *k*, *l*, *m*. Contact screws are secured to steatite brushes or plugs screwed into the lower plate *g*. A frame *h* having radiating arms is secured to the upper and lower plates by screws *i*. In Fig. 7 is shown a heater of this type used with a kettle, having handles 10 for connexion to a source of supply. Each handle, Fig. 9, has a collar *z* with two projecting stems 1, 2 insulated by washers 4, 5 from the frame of the kettle, and connected to one end of the wire and to the handle 10.

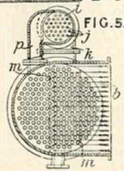
15,164. Halket, J. P. July 1.

Heating liquids.—An evaporator, feed-water heater, or the like contains a number of heaters any one of which may be separately removed for cleaning &c. without causing the cessation of the working of the apparatus for a period longer than necessary to remove the heater and to close the corresponding opening in the shell or to substitute a fresh heater. The heaters, which are either singly or in groups secured to caps *e*, may consist of coils *a* with return tubes *b*, as shown, or of Field tubes, preferably of flattened cross-section for the greater part of their length. Common steam and drain pipes *g*, *j* are connected to each heater by separate pipes, which are plugged when the corresponding heater is removed. When a group of Field tubes is connected to a cap to form one heater, passages are framed in the cap and the tubes are secured by means of plugs with openings leading to these passages, thus providing communication between each tube and the supply and the drain pipe. The Field tubes may be formed with a slight spiral so that their expansion causes an automatic sealing to take place.



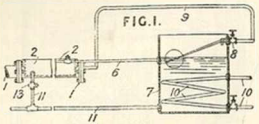
15,186. Thomas, P. July 2.





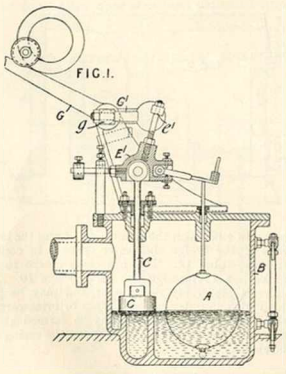
Heating liquids.—A condenser, which may also be used for heating liquids by steam, is made in two divisions, one serving to condense the steam and the other to cool the air and non-condensible gases that enter the condenser with the steam. The cooling-water enters the upper header *k*, passes through the tubes *j* in the upper chamber *i* of the condenser to the header *l* connecting the upper and lower chamber, thence flows through the tubes in the lower chamber, and is finally withdrawn through the outlet *e* in the header at the further end of this chamber. The steam entering at an inlet *b* passes between the tubes in the opposite direction to that taken by the water. Baffles *m*, *m* cause it to take a zigzag path as it travels through the condenser. The greater portion of the steam is condensed in the lower chamber and is withdrawn through the outlet *o*. The remaining steam and non-condensible gases pass through the opening *p* into the upper chamber, where the last traces of steam are condensed and the other gases are cooled to a temperature approximately equal to that of the incoming water. These gases then escape through the outlet *c*. The tubes in the upper chamber are preferably fewer in number and smaller in diameter than those in the lower in order to cause a more rapid flow of water through this chamber. The steam inlet opening is made the full depth of the lower division of the condenser, thus keeping the uppermost and lowest tubes of this chamber at the same temperature. The two chambers may be separate or enclosed within one casing.

15,188. Griffiths, J. A., and **Griffiths, E.** July 2.

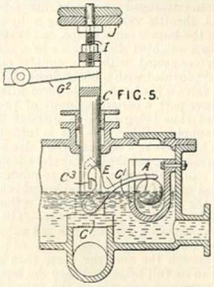


Heating buildings. — Open troughs 2, supported on pipes 1 of a heating system, contain water, which is kept at a constant level by a ball tap 8 in a cistern 7, a supply of hot water being thus obtained. The troughs are preferably made saddle-shaped, and are held in position by lugs at their extremities fitting over flange bolts at the junctions of the pipes; or, in the case of spigot joints, by lugs on each side carrying pinch screws. The troughs may be cast integral with the pipes. When the pipes are heated by hot water, the ball tap 8 may be connected by a pipe 9 to the hot-water supply. When the pipes are heated by steam, the supply of water may be heated by steam from a boiler or from the heating-pipes; or a heating-coil 10 may be fitted within the cistern. Circulating-pipes 11 communicating through cocks 13 with the troughs may be fitted, so that a constant circulation is kept up through the pipes 11, troughs 2, cistern 7, and supply pipe 6. The cistern may be saddle-shaped to fit over the heating-pipes.

15,194. White, J. July 2.



Steam traps.—The water, discharged from the drying-cylinders of paper-making machines &c., in the manner described in Specification No. 4174, A.D. 1904, [*Abridgment Class* Paper &c.], is removed from the chamber B, Fig. 1, through a discharge valve C automatically controlled by a float A. Pivoted on the end of a rod *c*



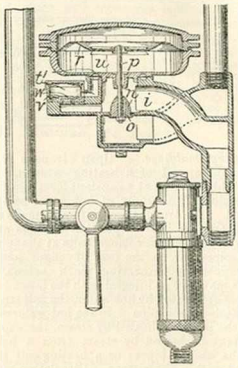
attached to the valve, is a block E^1 carrying an adjustable catch pin e^1 and a pivoted lever E. The lever operated by a rod is attached to the float A to move the catch-pin e^1 into the path of a lever G^1 which is mounted on a shaft *g* and reciprocated by a crank-pin fixed on the end of one of the drying-cylinders or other suitable moving part and acting on a lever G. The lever G^1 thus raises the valve C and allows the water to escape. A signal indicating that the valve C is in motion may be attached to the catch-pin e^1 by a chain. In a modification shown in Fig. 5, the lever E is pivotally mounted on the valve C inside the chamber and operated by direct contact with the float A. The valve spindle C is actuated by the lever G^2 and is free to move without lifting the valve C. As the float rises, it lifts a part of the lever E into engagement with a pin or projection c^3 on the spindle *c* and causes this to lift the valve. The lift of the spindle is adjusted by a screw I, and weights J assist its fall. The water to raise the float may be caused to pass over a partition C^1.

15,257. Schmidt, O. July 2. *Drawings to Specification.*

Boiling-pans.—In an apparatus for boiling easily foaming or frothing substances, such as resin in the production of resin size, apparatus is provided for cooling the rising substances consisting of coils, which are cooled by liquid, and may be raised or lowered by means of a supporting chain. The coils are not in contact with each other and lie, at least partly, one above the other. The resin or other substance is heated by steam coils at the bottom of the vessel.

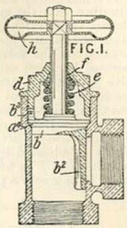
15,362. Deutsche Continental Gas-Ges., and **Mucke, F.** July 3.

Heating water. — In connexion with a water heater, the gas pressure is regulated, and the sudden formation of a full-sized flame is prevented, by means of a valve of special construction operated by a membrane arranged on the burner side of the valve. A throttle valve *n* having a by-pass *o*, is placed in the burner supply pipe, and is secured by a rod *p* to a weighted diaphragm *r* in a chamber *u*, which is connected with the supply pipe by a passage t^1 provided with a bored disk valve *v*. The throttle valve *n* is of paraboloid form with a cylindrical lower part, a certain amount of preliminary movement thus being possible without increasing the gas supply. When the gas is turned on, the pressure in the tube *i* between the valve *n* and the burner is reduced, and the gas therefore flows through the hole *o* in the throttle valve *n* to produce a small flame and also from the diaphragm chamber *u* through the hole *w* in the disk valve *v*, thus causing the weighted diaphragm to lower. The valve *n*, therefore, leaves its seat, but the gas supply is not increased until the paraboloid part of the valve passes through the seat, the flame then gradually growing to its full height. When the tap is turned off, the increased pressure in the tube *i* is immediately communicated to the diaphragm chamber *u*, owing to the lifting of the valve *v*, and the flame is therefore at once extinguished.



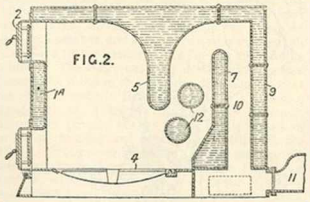
15,386. Butler, B. July 4.

Heating buildings &c.— Relates to plug valves applicable to radiators and heating systems. To prevent leakage past the spindle, the plug *b* is formed with a valve face a^4 engaging with a corresponding seating on the valve casing. A spring *e* presses the plug to its seat, and also keeps packing *f* pressed round the spindle. The plug *b* may consist of an ordinary ordinary hollow plug or of a wing b^2 only, and it is provided with a projection b^3, which, by its movement in a slot in the cap *d*, limits the rotation of the plug. By unscrewing and removing the cap *d*, the whole of the parts can be lifted away from the valve body. The hand-wheel *h* is hollow, the two halves being cast separately and then joined together.



15,392. Naylor, S., and **Lumby, Son, & Wood.** July 4.

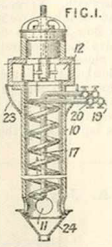
Heating water.—A boiler having back and front water walls 1^A, 9 contains a pendent water space 5 extending downwards into or above the furnace, a vertical water bridge 7, and cross water tubes 12. The fuel fed through the door 2 is supported upon the grate 4 between the front well 1^A and the lower parts of the bridge and water space 5 in contact with the tubes 12. The hot gases escape to the smoke box 11 through the vertical flue 10. The boiler is preferably rectangular, and may be provided with an outer casing of iron or brickwork, in which case additional flues may be formed at the back and sides of the boiler between the casing and the shell.



15,415. Williams, L. July 4.

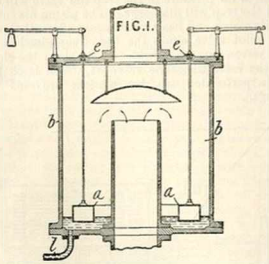
Heating air; heating buildings &c.—Relates to apparatus for heating and ventilating staterooms, cabins, saloons, &c. of passenger steamers travelling between tropical and colder regions. A casing 10, extending from near the floor to near the ceiling and provided with openings at the top and bottom, encloses vertically arranged heating pipes or radiators 17. A power-driven fan 12, mounted at the upper end of the casing, draws air into the apparatus through the lower opening 11 and discharges it from the upper end by an opening (not shown) in an horizontal direction. The pipes 17 are connected by cocks 19 to a supply of heating fluid. A drip basin 23 encircling the upper portion of the casing catches water of condensation which may be allowed to run into a second drip-pan 24 arranged at the lower end of the casing. In a modification, the coiled pipe is replaced by a series of nested U-tubes, each tube having its supply and discharge ends connected to separate inlet and return chambers. The fan is mounted on an horizontal axis. The fan may also be driven by a motor driven by the flow of the circulating fluid. According to the Provisional Specification, the apparatus may also be employed to dry or heat the air in staterooms, officers' quarters, working rooms or lavatories of steamships, private houses or hotels, or to ventilate these structures without heating.

FIG.1.



15,589. Bradford Dyers' Association, and **Worsley, E.** July 6.

FIG.1.



Steam traps.—Air is admitted automatically to a vacuum evaporating-apparatus whenever priming takes place, so as to allow liquid collected in a catch-vessel to flow back to the evaporator. In the arrangement shown in Fig. 1, two air-inlet valves *e* are fitted to the top of the catch-vessel or separator *b* and are operated by a float *a*. The liquid in the catch vessel can be passed back to the evaporator through a pipe *l*.

15,597. Arduino, P. T. July 6.

FIG.1.

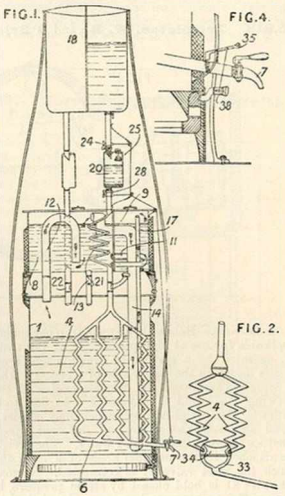


FIG.4.

FIG.2.

Heating liquids.—In apparatus for heating and dispensing liquids, such as punch, the liquids from a reservoir 18 flow through a measuring-vessel 20 connected to zigzag pipes 4 which have a common outlet 6 and are heated by a fluid contained in a tank 1. The angles of the pipes 4 may be very acute and may be arranged radially relatively to each other, as shown in Fig. 2. In this arrangement, the pipes open into a chamber 33 within which is a receptacle 34 for hot water. Means are also provided for igniting the heated outflowing liquid. The liquids contained in one or more compartments in the reservoir 18 flow through a coil 21 or pipe 22 arranged in an upper tank containing warm water to the zigzag pipes 4 immersed in the liquid in the lower tank 1 which is heated by a burner.

The upper tank is divided into two portions. Water contained in the portion 9 is heated by a U-pipe 11 extending from the other part of the tank and may be drawn off. The liquid contained in the part 8 of the tank is heated by steam supplied from the lower tank through the pipe 12. Water may pass from the upper to the lower tank through the pipe 13. Communication between the upper and lower tanks also takes place through the pipes 14, 17, which are steam discharge pipes. The measuring-device consists of a glass vessel having a float-controlled air valve 25. The inlet and outlet valves 24, 28 are connected to the draw-off tap 7 so as to be simultaneously operated therewith. Normally, the outlet valve 28 is closed and the inlet valve 24 open, thus allowing the liquid to flow into the device, the float closing the air valve 25. In operating the tap 7, the inlet valve 24 is closed and the outlet and air valves opened, allowing the liquid to flow through the heater. The coil 21 may be replaced by a single tube or a double coil. A gas jet 38, Fig. 4, is connected to a lever 35 so that when this lever is depressed and the tap 7 opened the issuing liquid is ignited.

15,918. Templeton, W. R., and **O'Brien, W. A.** July 11.

FIG. 1.

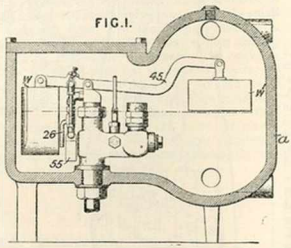
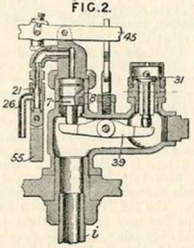


FIG. 2.

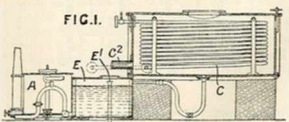


Steam traps.—Relates to a steam trap particularly applicable for use at high pressures. A pilot valve 21, operated by a system of weights and levers, admits liquid to the upper side of a piston 7 which is depressed and opens the discharge valve 31, thus allowing the liquid in the casing *a* to flow to the outlet *i*. The weights *w*, *w*¹, which may consist of metal and soap-stone, are of different specific gravities greater than that of water. The weights are attached to the unequal arms of a lever 45 to which the pilot valve 21 is connected. Normally the valve 21 is held closed by steam pressure, but when sufficient pressure has accumulated the lever 45 rocks and forces the valve from its seat. A weight 55 causes the valve to open quickly and remain in its open position. The liquid passes to the valve 21 through a pipe 26 which dips below the surface of the liquid to arrest the entrance of grease. The stems of the piston 7 and the discharge valve 31 abut against a pivoted lever 39. The area of the piston top is greater than that of the valve 31 so that the piston may open the valve on the pilot valve being opened; and the piston is heavier than the valve and its stem, so that when there is no pressure in the trap the valve will open and the trap will discharge. The piston fits loosely in its casing and has a vent passage 8, so that when the pilot valve closes the liquid contained behind the piston escapes slowly and cushions the closing of the valve 31. The valve 31, which is enclosed by a perforated cap, has a stem provided with wings.

16,291. Smith, A. July 16.

Heating water.—Relates to plant for the treatment of water for whisky distillation and for other brewing purposes. Water is passed through a filter A and is heated in a coil C, supported in a tank to which steam is supplied by inlets c^3 near the bottom of one side. The water of condensation flows from the tank to a second tank E, which is fitted with a perforated pipe E^1 for the removal of oil &c. The water then passes to the feed-water.

FIG. 1.



16,336. Reck, A. B. July 16.

FIG. 1.

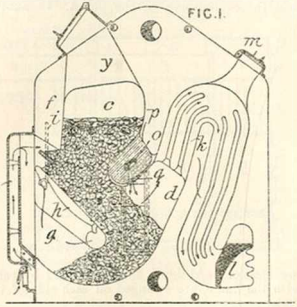
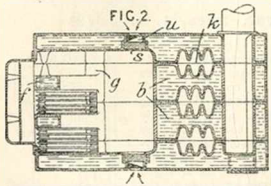


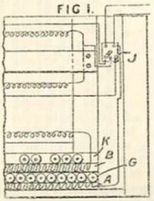
FIG. 2.



Heating water.—A cast-iron sectional boiler of the kind in which each section *b* contains part of the combustion chamber *d* and fuel-magazine *c* is provided with a sloping grate *h*, which is formed or supported by water-legs *g* depending from vertical water-walls *f* forming the front of the magazine. Part of the vertical water-walls may be formed as a grate surface. The combustion chamber *d* communicates with the flue *l* by corrugated S-shaped flue passages *k* between the elements, a door *m* being provided at the top of the boiler to facilitate access to the passages. Air for secondary combustion is supplied through vertical side passages *u*, which are lined on the furnace side with fire-proof material *s*. These passages may open into passages *o*, *q* formed in brickwork *p* placed in front of the flues. Air for primary combustion may be pre-heated by allowing it to pass through the hollow wall *t* of the ash-pit door. The vertical water-walls *f* may be provided with internal portions *i*, and may either be formed independent of the main part of the sections or be connected therewith by means of hollow webs *y*.

16,358. Turner, R. R., and **Bernitt, J. C.** July 16.

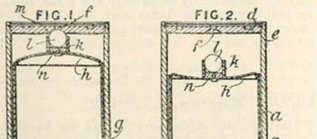
FIG 1.



Heating by electricity.—An electric heating-device for organs &c. is employed to warm the keyboard and principal mechanism and reduce moisture in the instrument. Coils of german silver, copper, or iron wire, with asbestos, rubber, mica, or other substance, are placed below the keys and are connected to a switch J, by means of which some of the coils can be cut out to regulate the heat. The elements A, B consist of german silver wire wound upon a layer of asbestos and enclosed between layers of asbestos. For large organs the heater may be arranged in sections.

16,511. Burnet, H. July 18.

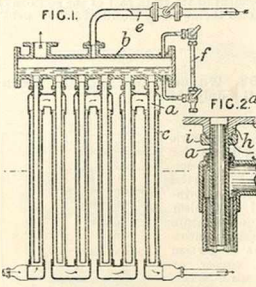
Heating by steam circulation; heating buildings &c.—Relates to valves adapted to permit the free passage of cold air but to prevent the passage of liquid or hot fluid, being particularly applicable for use in steam-heating systems. The valve casing *a* has an inlet *b* and outlet *f*. The top *d* is screwed into the valve-casing and abuts against a shoulder *e*. Within the casing is a chamber *g* with stiff walls and flexible ends *h*, *i*, which have their edges rounded and soldered to the inner side of the chamber *g*. In the process of manufacture, the chamber *g* is cooled in cold water just before the ends are soldered on; the air within the chamber will thus be of greater density than the outside air. The inner side of the chamber *g* and its ends are coated with shellac varnish to prevent escape of air. To the end *h* is fixed a cup *k* containing a



ball *l* which engages with the seat *m* when the valve is closed. A rubber disk *n* prevents wear of the diaphragm *h*. In the position shown in Fig. 2, air can pass from the inlet *b* between the chamber *g* and casing *a* and so to the outlet *f*. If steam enters the casing, the air in the chamber *g* expands and distends the diaphragms *h*, *i*, as shown in Fig. 1, thus causing the ball *l* to close the outlet *f*. If water enters the casing, the chamber *g* floats and again causes the ball *l* to close the outlet *f*.

16,760. Jenkins, A. E., [*Jenkins, G. P.*]. July 22.

FIG. 1.

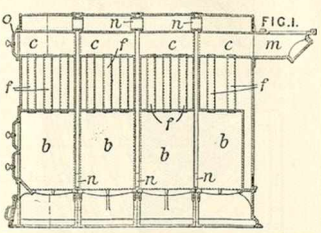


Heating liquids.—Relates to refrigerators, boilers, &c. in which the heat from one fluid may be communicated to another. The liquid to be evaporated, such as ammonia, carbon dioxide, or water, is led through a delivery pipe *e*, Fig. 1, into a tank *b* where it fills pendent closed tubes *a*. The fluid serving as the heating-agent passes in series through outer pipes *c* which enclose the tubes *a*. A gauge glass *f* indicates the liquid level in the tank *b*. The inner tubes *a* are screwed into bosses *h*, Fig. 2a, on the tank *b*, and a gas-tight joint is formed by nuts *i* over the tubes pressing on copper or soft-metal rings *j* resting on the bosses. The outer pipes may be permanently secured to the inner tubes, or ordinary stuffing boxes may be used. The heating-fluid may be exhaust gases from a gas or oil engine.

16,779. Kitchen, J. July 22.

Heating water.—Sectional boilers for heating-apparatus are formed of wrought iron or steel, each section being fitted with smoke-tubes *f* connecting a furnace space *b* with a flue *c*. The sections are placed together with nipples *n* connecting their water or water and steam spaces. Cleaning-doors *o* are fitted at one end of the flue *c* and the connexion *m* to the chimney at the other end. In one modification, the space *b* of the last section is utilized as a smoke-box, the gases being led into it from the flue *c* through the corresponding tubes *f* and thence escaping to the outlet. In another

FIG. 1.

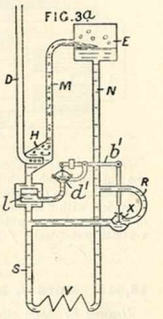


modification, additional flues, connected by tubes with the flue *c*, are arranged on each side of the grate.

16,782. Reck, A. B. July 22.

Heating buildings; heating water; thermostats.—In steam water-heaters used in connexion with hot water circulating systems, and specially adapted to be heated by low-pressure steam, a by-pass, closed automatically or by hand, is arranged to direct a portion of the heated water from the pressure to the suction side of the heater, thus preheating the inflowing water and enabling the heater to work noiselessly. Specifications No. 454, A.D. 1871, [*Abridgment Class* Injectors &c.], No. 14,474, A.D. 1899, No. 21,406, A.D. 1903, No. 3797, A.D. 1904, and No. 2045, A.D. 1905, are referred to. Steam is passed through a pipe D into a heating-chamber H, whence the mixed steam and water pass by a rising pipe M to a tank E. The heated water passes by a pipe N to radiators &c. V, and thence back to the heating-chamber H by a pipe S. The by-pass R connects two points on the main circuit, between which are included the heating chamber H and the circulating-device consisting of the rising pipe M or a pump. To cut out the by-pass when the inflowing water attains a sufficiently high temperature, a chamber *l* containing a volatile liquid is fitted in the inlet pipe, and closes a valve X in the by-pass by means of a movable diaphragm d^1 operating a lever b^1; or the pressure of the steam in the tank E may actuate a similar diaphragm.

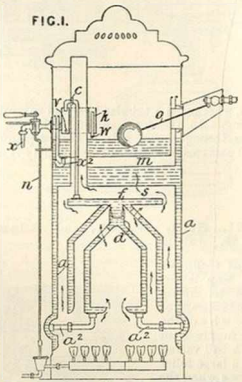
FIG. 3a.



Steam escaping from the tank E may be used to heat the cold water, by passing through a condenser arranged round the inlet pipe, or by being directly passed into the cold water. According to the Provisional Specification, the steam may act with injector action.

16,804. Jackson, H. July 23.

FIG. 1.



Heating water.—Relates to a modified form of the water boiler described in Specification No. 11,927, A.D. 1894. A ball valve regulating the water supply floats in a trough *o* isolated from the hot water by an air space *m*. From this trough the water flows by a trap x^2 to a cistern *s*, whence it passes to an outer water casing *a*, and through couplings a^2 to a series of water-way cylinders situated above the gas burners. The water passes from the cylinders, which are connected together by means of a tapered screw joint *d*, through a plate *f* and a pipe coupling *c* to a cylindrical expansion chamber *k*, whence it is withdrawn in a boiling condition through a tap *x*. A small aperture *v* in the expansion chamber allows water to leak back into the cistern, thus preventing it from cooling in the chamber; an overflow pipe *w* is also provided. The gas supply is controlled by a gas valve, fitted with a by-pass, and provided with a long stem *n* which has a handle extending under the handle of the water cock *x*.

16,866. Allen, R. July 23.

Heating liquids; heating gases.—A tubular feed-water-heater, Fig. 2, consists of a series of straight water-pipes *d* connecting heaters *c*, around which pipes live or exhaust steam circulates while the water is caused to flow repeatedly across the steam space by the heaters. The pipes *d* are fitted with rods *e* extending across the heater so as to limit the water to a narrow annular passage. Some of

FIG. 4.

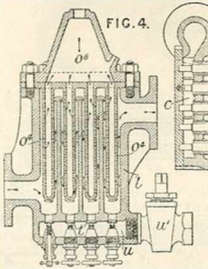
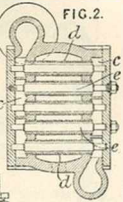


FIG. 2.

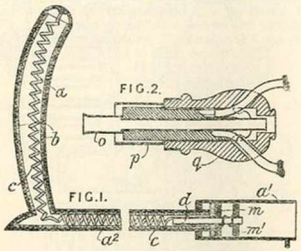


the rods may be provided with a screw-thread and nuts at the end to act as stays for the heater. Fig. 4 shows another form of feedwater-heater. The water passes under chambers or tubes o^4, which are in communication with a steam chamber o^6, and may be perforated, thus heating the water by actual contact with steam. Baffles may be provided. Holes permit the escape of gases from the feed-water. A sludge channel *u* is put in communication with any desired part of the heater by valves *t*, and the sludge is blown off through a valve u^1. This form of heater may be built up from parts bolted together; it may have only one pendent steam chamber, which, according to the Provisional Specification, may be fitted with a helical rib to direct the passage of water. The feed-water may be passed through the two heaters shown in Figs. 2 and 4 successively. One section of the heater may be utilized as a surface condenser, while other sections may be fed with live steam so as to raise the temperature of the feed-water to as high a degree as possible. In the Provisional Specification it is stated that the apparatus might be used for heating any liquid or gas.

17,079. Gschwend, J. July 25.

Heating by electricity.—An electric heating-device for cavities of the body consists of a metal tube *a*, Fig. 1, shaped to the particular cavity to be treated, and in some cases formed with a tubular metal handle a^2. The tube and handle are lined with insulating-material and contain a heating-coil *c*, one end of which is attached to the tube *a* and the other to a tubular terminal *d*, insulated from the handle, and carrying a fixed metal disk *m* and a spring-controlled sliding-disk m^1. Connexion with the source of current is made by means of a plug *q*, the tubular terminal *o*, and casing *p* of which, make contact with the disk m^1 and casing a^1

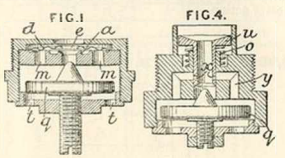
respectively. A thermometer may be inserted through the tubes *o*, *d*. In a modification in which a thermometer is not used, the tube *d* and disks *m*, *m*¹ are replaced by a solid spring-actuated contact rod, co-operating with a solid terminal in the



plug *q*. During cleaning and sterilizing, the socket *a*¹ may be closed by a rubber plug or by a cover fastened in place by means of a bayonet joint.

17,180. Still, W. M., and **Adamson, A. G.** July 26.

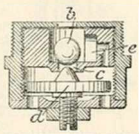
Steam traps.—A thermostatic steam trap is provided with a valve to ensure the rapid escape of water when the steam supply is cut off. In one form, Fig. 1, a diaphragm *d* is fixed at its outer edge, and is seated against a ridge *a* by the pressure of the steam, so that when the supply of steam is cut off the diaphragm is lifted by its own elasticity, assisted if necessary by a spring, and water escapes readily through apertures *e*, *m*, *t*. An expansible fluid-containing chamber *q*, as described in Specification No. 21,571, A.D. 1902, controls the escape of water when the steam supply is on. The diaphragm may be replaced by a dished



piston, working in a tubular boss and controlled by a spring. In the form shown in Fig. 4, water escapes through ports *x* in a hollow piston *u*, to lateral passages *y*, when the steam supply is cut off.

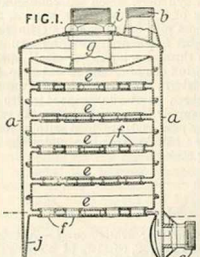
17,181. Still, W. M., and **Adamson, A. G.** July 26.

Steam traps.—A steam trap is arranged to ensure the rapid escape of water when the steam supply is cut off. A ball valve *b* closes a large relief passage *e* when the steam supply is on; when it is cut off, the ball falls by its weight and covers a lower outlet *c*, which is also adapted to be closed by a thermostatic valve *d*, such as that described in Specification No. 21,571, A.D. 1902.



17,202. Ewart, J. W. July 27.

Heating water.—A water-heater has a casing *a* with passages *b*, *c* for the water to be heated, and inner boxes *e* through which combustion products pass, the water being in the thin spaces between the casing and boxes. The boxes consist of dished sheets of metal connected in pairs, each communicating with the next by a number of short pipes or nipples *f*. The dished plates may be formed by spinning or stamping. The combustion products pass from the deep bottom section *j* through the boxes, and finally escape through a flue *g* which is held in place by a nut *i*.



17,240. Friedenthal, H. July 27.

Heating gases; heating liquids.—Relates to heat transmitters, which may serve as steam generators, condensers, economizers, superheaters, and the like. Two or more series of separate pipes are employed which cross one another, and are so placed that the whole of their surfaces are in direct metallic contact, thus forming a solid block, while the pipes of each set communicate with a common inlet and outlet chamber. The pipes *a* open into common chambers *b*, provided with inlet and outlet openings *h*, *i*, Fig. 2. At right angles to the pipes *a*, and connected thereto by metallic means, is arranged the set of pipes *c*, which open into the common chambers *d*, Fig. 1. Partitions *e* are fitted in the end chambers *b*.

FIG. 1.

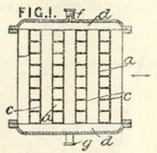
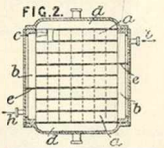


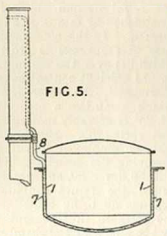
FIG. 2.



17,331. Boult, A. J., [*Hildesheimer Spar-herdfabrik A. Senking*]. July 29.

Boiling-pans.—In a portable cooking-apparatus, the boiler 1 is provided with a jacket 7 containing a liquid of high boiling-point, such as glycerine, and communicating with the air by a pipe 8 which passes up, and through the wall of, the chimney, and has a hinge in alinement with the hinge of the chimney to enable it to be lowered with the latter into the horizontal position. In a modification, the flue and lower part of the chimney are similarly encased in a bath, the heat of which will complete the cooking after the fire has been extinguished.

FIG. 5.



17,485. Brooks, J. B. July 31.

FIG. 4.

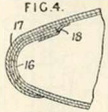


FIG. 8

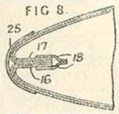


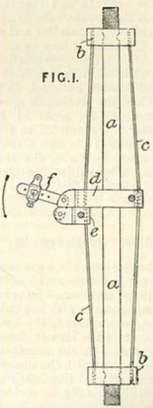
FIG. 25.

Hot-water bags and the like.—Means are described for making seams or joints and corners, and for covering the seams so that the edges of the material are protected from the liquid. The bottle &c. is made from a single piece of rubbered canvas, and the edges 16, 17 are either overlapped and vulcanized as shown in Fig. 4, or turned in as shown in Fig. 8; in the latter case the joint is strengthened by an outer binding strip 25. The edges are protected from the liquid by a strip or strips of pure rubber 18. The edges of rubber bags may be overlapped and strengthened by a strip of canvas between the edges, as shown in Fig. 25. Several methods of forming the corner joints are described, in which the corners of the two parts of the bottle &c. are shaped so as to overlap, the joint being covered and strengthened by a corner piece on the outside.

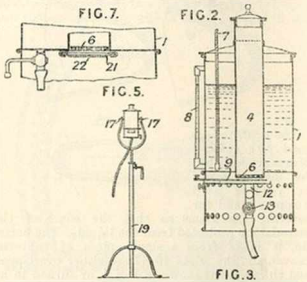
17,491. Wagstaff, J. G. July 31.

Thermostats; steam traps.—A thermostat has flat springs *c*, connected at each end with blocks *b* fitting on an expansible pipe *a* conveying a fluid, and arranged so that the lateral movement of the springs is magnified by a lever *f*, two points of which are connected to the springs by brackets *d*, *e*. The lever may be connected with dampers, or may actuate a valve in a steam trap or elsewhere.

FIG. 1.



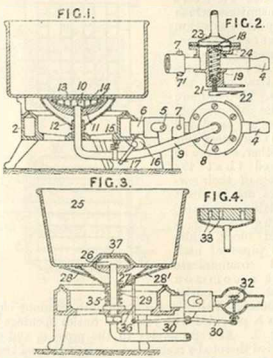
17,785. Du Plantier, E. de N. Aug. 4, 1906, *[date applied for under Patents Act, 1901]*.



Heating water.—An irrigator vessel is provided with heating-means so that a douche of constant temperature may be obtained. The vessel 1, Fig. 2, is provided with a central flue 4, at the base of which is placed a grate 6 to support a slow-burning fuel block. A water gauge 8 and thermometer 7 are provided, and the rate of combustion of the fuel is controlled by pivoted damper plates 9, the distance between which may be regulated from the outside. The water is drawn off through pipes 12, Fig. 3, leading to the cock 13 and thence to a flexible tube, to which the douche tube is attached. The vessel is provided with handles and also with trunnions 17, Fig. 5, so that it may be mounted on an adjustable stand 19. The Specification in the original form as published under the Act of 1901 describes also a modification in which only one draw-off pipe is used and the pivoted damper plates are replaced by a single sliding plate 21, Fig. 7, formed with a circular depression 22 to receive ash falling from the grate. It is also stated that the vessel may be heated by gas or electricity in place of the fuel block. This subject-matter does not appear in the Complete Specification as accepted.

17,929. Junkers, H. Aug. 7.

Thermostats.—In a gas cooking-stove of the type wherein an automatic heat regulator, having a sensitive member adapted to be brought into thermal contact with the outer wall of the cooking-vessel, is employed, the sensitive member is protected from the burner flame and the radiant heat therefrom. In the construction shown in Fig. 1, the thermostat 10, the underside of which is coated with asbestos or like heat-insulating material 11, is mounted centrally in a ring burner 2, being protected from the flames by a guard 12. A pipe 9 connects the interior of the thermostat with an ordinary gas-regulating valve 8. The gas-supply pipe 4, valve 8, and nozzle 5 may be mounted on trunnions 7, 7^1, Figs. 1 and 2, in the mixing tube 6,



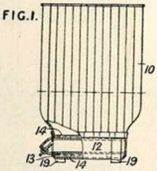
to permit of the spring 15 bringing the thermostat into contact with the underside of the cooking-vessel 1. Alternatively, the pipe 9 may be made springy, thus dispensing with the necessity for the trunnions and the spring. An eccentric cam 16, actuated by a handle 17, serves to withdraw the thermostat from the vessel bottom. Otherwise the thermostat may be fixed some distance below the vessel bottom, thermal communication being established by means of an interposed metallic &c. member. In the construction shown in Fig. 3, the base of the vessel is provided with a recess 37 which fits over the thermostat 26. In this case, to ensure efficient contact between the vessel and the thermostat, the latter is fixed and the support which comprises a protecting-shell 27 and arms 28, 28^1 is movably mounted on a sliding sleeve 29 and spring 35. Any ordinary automatic device may be employed to cut off the gas supply on removing the vessel 25. This may consist of the link 36, lever 30, and gas valve 32, as shown. In action the liquid contained in the thermostat expands on being heated, or forms gas or steam, the pressure thus generated being communicated by the pipe 9 to the chamber 23 of the gas-regulating valve, Fig. 2, where it depresses the diaphragm 18, thus actuating the spring-controlled valve 24 and decreasing the gas supply. The pressure of the spring 19 may be varied by the screw 21 and the handle 22. In modifications the diaphragm 18 may be replaced by a Bourdon tube or by other regulating means. The thermostat cap 13 may be provided with internal ribs 14, Fig. 1, or with blind holes 33, Fig. 4, to facilitate the transmission of heat to the contained liquid which is preferably non-corrosive in character, and may be

alcohol, ether, water, toluene, &c. Alternatively, the thermostat may contain air, pentane vapours, or some other suitable gas.

18,259. British Thomson-Houston Co., [*General Electric Co.*]. Aug. 12.

Heating by electricity.—An electric heater has a corrugated air-tight casing 10 provided with a heating unit, fitting into a sleeve 12 which is surrounded by a liquid 14 in an annular space 13. The area of the radiating surface may be such that no pressure is produced inside the casing, or such that a certain pressure is attained but not exceeded. The air in the casing may be rarefied, so that the heater may be worked at a temperature lower than the normal boiling-point of the liquid. In a modification, the heating unit is inserted in a solid metal plug, in the top of which is a groove containing the liquid. The heater may rest on feet 19, or be supported by hooks.

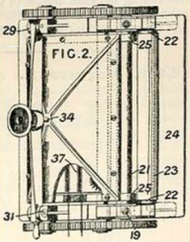
FIG.1.



18,565. Thompson, J. H., and **Murphy, J.** Aug. 16.

Heating by electricity.—The smoothing-plate of an ironing-machine is hollow and is heated internally by gas or electricity. When electricity is used, the plate is lined with a non-conductor and the electric heater 37 is connected by suitable insulated terminals with the source of current.

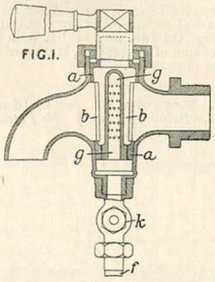
FIG.2.



18,570. Laing & Sons, Sir J., and **Petrie, J. T.** Aug. 16.

Heating liquids.—A cock or valve, admitting steam to liquid passing therethrough for the purpose of heating the liquid, comprises a plug cock *a* having a through liquid passage *b* and a communication with a steam-pipe *f*. The steam enters the through passage in the plug through one or more perforated casings *g*. When the cock is closed, both steam and liquid are cut off. A cock *h* may be arranged in the steam pipe to cut off the steam when unheated liquid is required.

FIG.1.



18,699. Rigg, J. Aug. 19.

FIG.3.

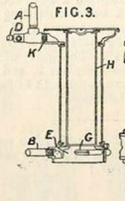


FIG.1.

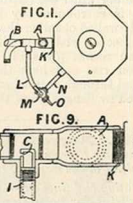


FIG.9.

Heating water; heating buildings &c.—A water-heating stove of the type described in Specification No. 4767, A.D. 1904, in which a boiler is mounted in a casing, is arranged so that steam generated within the boiler may be utilized for humidifying the air of the room &c., or for causing the combustion products to flow into a fume and steam condensing tube circulating in the room &c., when it is desired to heat the latter; it is further provided with a fume tube passing into the outer atmosphere to cause a natural draught through the stove for raising steam initially. Also, the stove base may be enclosed and air for combustion supplied from without the room &c. by a pipe. The fume outlet K, Figs. 1, 3, and 9, is provided with the vertical or inclined tube A for natural exhaustion of the fumes, and with the preferably slightly descending fume and steam condensing tube D, through which the fumes are impelled by the steam-jet C on the pipe L, Figs. 1 and 9. This pipe is fed by a pipe N which leads from the boiler H and is provided with a cock M for alternatively supplying steam to the jet C or to the room through the humidifying jet O. When the stove is used in greenhouses, conservatories, &c. the base E, Fig. 3, is enclosed, the air being supplied from the outer atmosphere by a pipe B,

and a door being provided for insertion and removal of the gas ring burner G, or other oil, electric, &c. heating means employed. When the stove is applied to medicinal uses for asthmatical and bronchial patients, and for fumigating and disinfecting, the base may be left open as usual. The outer ends of the pipes A, B are shielded from the action of the wind.

18,818. Roggero, E. Jan. 25, [*date applied for under Patents Act, 1901*]. *No Patent granted* (*Sealing fee not paid*).

FIG.1.

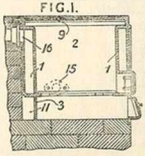
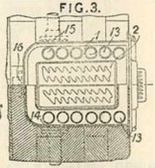


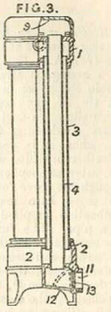
FIG.3.



Heating water.—The fire-grate 2 of a cooking-stove is surrounded by a boiler consisting of a double-walled chamber the water space 1 of which is connected with a heating system by a flow pipe 16 and return pipes 14, 15. The gases of combustion rise and heat the hot-plate 9, and then descend through vertical smoke-tubes 13 to flues 11 formed by flanges 3 and the masonry.

18,821. Roggero, E. Jan. 1. [*date applied for under Patents Act, 1901*]. *Void.* [*Published under Patents &c. Act, 1907.*]

FIG.3.



Heating buildings &c.—A radiator for hot-water or low-pressure steam heating-apparatus consists of inner air tubes 4 surrounded by concentric outer tubes 3 which connect upper and lower headers 1, 2 containing hot water &c. The inner tubes 4 terminate at their upper ends in a chamber provided with a perforated plate 9. The tubes 4 may extend into a lower chamber which may be provided with dampers 13. The dampers admit either external cold air by the inlet 11 or air from the room through the opening 12.

18,829. Roggero, E. Oct. 10, 1906, [*date applied for under Patents Act, 1901*].

Heating water &c.—A sectional boiler for a hot-water circulation system is formed by assembling flat elements comprising each an upper collecting-box 2, a lower collecting-box 1 and two banks of annular tubes connecting the boxes at their opposite ends. The elements are connected by

FIG.2.

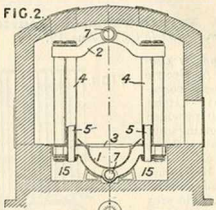
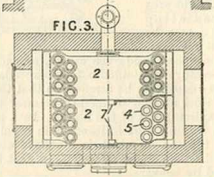


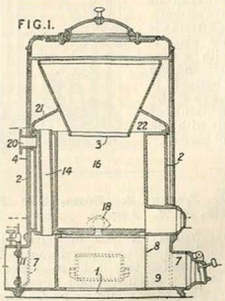
FIG.3.



bi-conical screwed collars 7 fitting into screwed nipples on the boxes. The masonry seat is so shaped that the boiler forms with it two lower smoke chambers 15 where the hot gases arrive after circulating between the tubes 4 and down the inner tubes 5. The lower headers 1 form an ash-box, and a flange supports the grate 3.

18,928. Roggero, E. Aug. 22.

FIG.1.

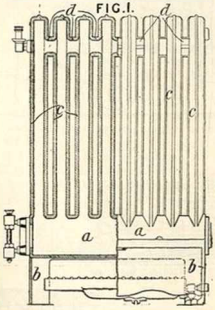


Heating water.—A boiler for heating water for warming buildings comprises an annular water

space 2 traversed by smoke-tubes 14 and a fuel chamber 16 fed through the hopper 3. The base 1 consists of two concentric flanged rings 7, 8 forming between them a smoke passage 9 which opens into the chimney at 11. The products of combustion, after traversing the fuel chamber, descend the smoke-tubes by way of the annular chamber 22 formed by the flange 21, and escape through the passage 9 to the chimney. The return pipes are connected at two opposite points 18, while the flow pipe leads out at 20. The boiler is enclosed by an insulating-casing 4 resting on the base 1.

18,974. Cannon Iron Foundries, Ltd., Whitehouse, E., and **Hawthorne, H. S.** Aug. 23.

FIG.1.

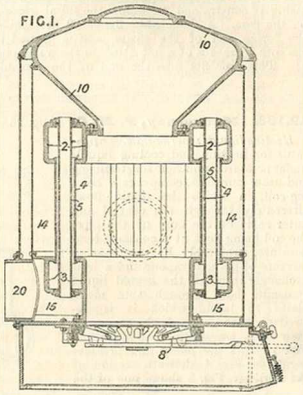


Heating buildings &c.; heating water.—Radiators of the type in which loops or upright tubular elements *c* are in communication at their lower ends with a boiler or steam-generating box *a*, and near their upper ends with each other by short connecting-tubes *d*, are cast with the boiler in one piece. The boiler is supported on a stand *b* and is heated by a gas or other burner.

19,055. Roggero, E. Aug. 24.

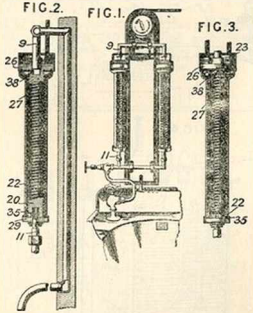
Heating water &c.—An annular-tube boiler comprises two ring-shaped collecting-boxes 2, 3 and a ring of compound annular tubes 4, 5 connecting them in the manner shown. A fuel hopper 10 rests on the upper box 2, and a vertical flange provided on the lower box extends downwards and is bolted to the base-plate, to which is attached also the grate 8. A double wall casing surrounds the boiler, forming smoke chambers 14, 15. The gases rise from the grate 8 outwards between the tubes 4 into the chamber 14, and thence through the tubes 5 to the chamber 15 and the exit 20.

FIG.1.



19,101. Rawson, D. B., and **Sager, E. E.** Aug. 24.

FIG.2. FIG.1. FIG.3.



Heating water.—An electric water-heater, which is able to withstand sharp changes of temperature, has an insulating-core 20, preferably of unglazed porcelain; on the cylindrical face of the core is formed a double spiral groove in which the resistance wire 22 is placed. The wire is fastened to a terminal 23 at the top of the core, passes down to the bottom in one groove, and back to the second terminal in the other. The core is provided with a flange 26 at its upper end which

receives the flared end of a glass casing 27. This casing is just large enough to fit over the core 20, so that any liquid passing through the casing is constrained to follow the spiral grooves on the core. A detachable flange 29 fits against the lower end of the casing and is secured to the core by means of a nut fitted on the water pipe 11. This pipe fits into the end of the core and is held there by cement. The exit pipe is secured in a similar way. Rubber rings &c. are used to make the joints water-tight. Transverse holes 35, 38 are drilled in the core to provide passages for the water to the casing. The water passing upwards along the grooves is heated and issues by the pipe 9. Any number of these heating-units may be used in parallel.

19,163. Mauvernay, P. M. C. Aug. 26.

Heating liquids; thermostats.—Apparatus for heating and cooling liquids under pressure, applicable for sterilizing and other purposes, comprises a heating-coil, in which the liquid flows alternately through the central and outer parts of the bore of the pipe, the coil being kept at a constant temperature, preferably by means of a mixture of gas and vapour and a heat exchanger in which the heated liquid transmits heat through thin metal plates to liquid which it is desired to heat. Fig. 1 shows a side view of a transportable installation, Fig. 3 shows the pump and pressure regulator, Fig. 4 shows a section of the sterilizer, Fig. 5 shows one of the

FIG. 1.

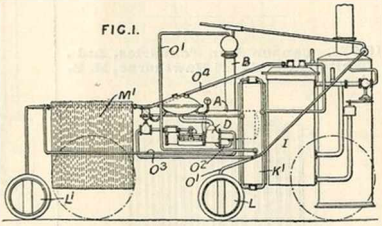


FIG. 3.

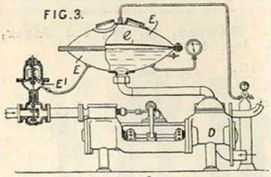


FIG. 5.

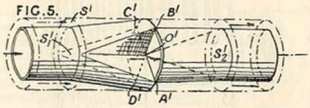


FIG. 9.

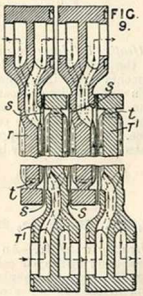
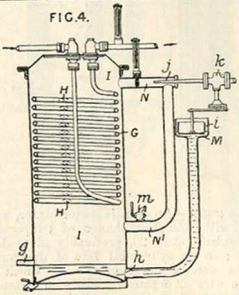


FIG. 4.



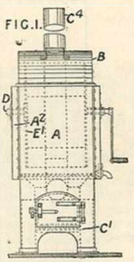
appliances for directing the flow of liquid from the inner to the outer parts of the pipe bore, and Fig. 9 shows a section of the heat exchanger. Liquid from the cask L, Fig. 1, is drawn through the pipe o^1 by the pump D and sprayed into the spherical head of the column B attached to the vessel A, in which

a partial vacuum is maintained by means of a steam jet for the purpose of freeing the liquid from dissolved gases. From the vessel A the liquid is pumped through the pipes o^2, o^3 to the heat-exchanger M^1, then through the pipe o^4 to the sterilizer I, then to the reservoir K^1, and finally, the liquid is returned through the heat-exchanger M^1 to the cask L^1. The apparatus for keeping the pressure of the liquid uniform consists of a receiver E, Fig. 3, in communication with the piping which delivers the liquid from the pumps D to the sterilizer I, provided with a rubber diaphragm *e* to prevent solution of the gas which is above the liquid and connected to a spring-pressed diaphragm E^1 which rises or falls with variations of pressure and controls the admission of steam to the pump D. The sterilizer I, Fig. 4, comprises a coil G through which the liquid flows, enclosed in a casing provided with a pipe *g* for condensation water, a pipe *h* leading to the reservoir M containing a float *i*, and the pipes N, N^1, and steam jet *j*. The admission of steam to the jet *j* is regulated by a valve *k* governed by the float *i* which rises or falls with the variations of pressure in the chamber I so that on any fall of steam pressure is admitted through the jet *j* until the pressure is raised again and a temperature is maintained corresponding to the pressure and to the proportions of air and steam in the mixture filling the chamber. The temperature may be raised by allowing air to escape through the cock *m*. The coil G is provided with a number of internal fittings H, of which one is shown on a larger scale in Fig. 5, constructed with inlet and exit cylindrical ends of half the sectional area of that of the bore of the pipe and with a recessed surface A^1 o^1 B^1 C^1 o^1 D^1 adapted to conduct the liquid from the outer part of the bore through the openings A^1 o^1 B^1 &c. to the front exit cylinder s^1_2, and the liquid from the inlet cylinder s^1_1, through the alternate openings to the space surrounding the exit cylinder s^1_2. The heat-exchanger is built up of a series of plates T, T^1, Fig. 9, arranged alternately, between which are clamped very thin metal sheets *s* which may be of aluminium, silver, silvered copper, &c. The sterilized liquid and the liquid to be heated flow in opposite directions along opposite faces of the sheets *s*. Passages *t* at the end of each plate T or T^1 permit the liquid to pass from one side of a plate to the other.

19,196. Arnold, J. Aug. 26.

Boiling-pans.—A washing-boiler of the domestic type is fitted with an internal cage to receive the clothes. The cage is so mounted that it can be rotated, usually while partly immersed. The plates of the boiler A are continued downwards to form the furnace C^1. A flue C^4, and strengthening-strips A^2, supporting ball bearings for the stub shafts, are provided, as also a lid B of partly cylindrical shape with handles. To the shafts are secured the side plates of the cage, which is formed of a number of symmetrically-placed lobes, kept apart by rods and provided with inwardly projecting beaters. In portable arrangements the boiler may be lifted off the furnace.

FIG. 1.



19,338. Geissinger, H. G. Aug. 28.

Thermostats.—A thermostat is designed to overcome the effects of the vibrations encountered in ships or trains. An adjustable damping effect or, in other words, an adjustable lag between the working temperature of the thermostat and the temperature of its surroundings is provided for, and can be made sufficient to overcome the oscillations of the bar due to the vibration of the ship or the like. Strips 2 of a dissimilar metal are fixed on opposite sides to the two legs of a U-shaped metal bar 1, and the compound thermostatic bar so formed is fastened to the framework 15 of the apparatus at 4, which also forms a terminal for the wire 14. The free end 16 of the thermostatic bar is provided with a contact-point 17. Fixed to the frame is an electro-magnet 9, the core 8 of which is provided with two adjustable pole-pieces 11, 7. The pole-piece 7 is electrically connected by a wire 13 with the electro-magnetic coil and a wire 12, and is provided with a point 6 adapted to make contact with the point 17 when the free end of the thermostatic bar is sufficiently deflected by a change in temperature. When this takes place the circuit is completed through the thermostatic bar, and the electro-magnet is energized. By suitably adjusting the pole-piece 11, although its extremity never comes into actual contact with the free limb of the thermostatic bar, the magnetic flux through the material of the latter can be varied.

FIG. 1.

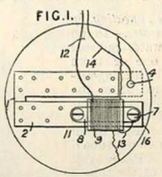
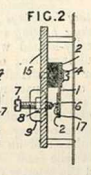
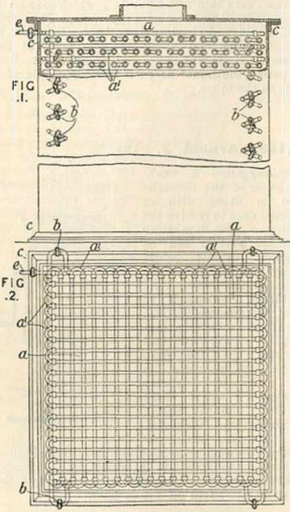


FIG. 2



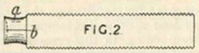
19,675. Edwards, H. E., and **Edwards, F. W.** Sept. 3. *No Patent granted (Sealing fee not paid).*



Heating water &c.—Relates to apparatus for the rapid generation of low-pressure steam and for heating water. Several horizontal coils in the form of grids are placed one above the other in a casing. The sections may be arranged at right-angles or so that the tubes appear in quincuncial order. The unions between successive sections are placed outside the casing. The tubes *a*, which may have a core of waved metal, are connected by return elbows a^1. Adjacent sections are joined by unions *b* which are outside the casing *c*. Water is fed in at the upper end *e*.

[Reference has been directed under Section 7 of Patents &c. Act, 1907, to Specifications No. 3788, A.D. 1880, [*Abridgment Class* Drying], No. 5310, A.D. 1881, and No. 13,410, A.D. 1896, [*Abridgment Class* Steam generators].]

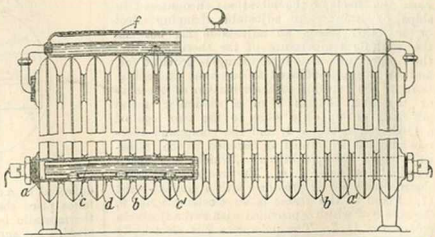
19,703. Robinson, J. G. Sept. 3.



Heating water.—Relates to boiler stays of the kind which are screwed into the boiler plates and then upset at their ends to form heads. The ends *a* which form the heads are made plain by reducing the diameter of the stay and are provided with cupped-shaped recesses *b*. The ends may be shaped with hollow sides, as shown. The invention is stated to be particularly applicable in connexion with the flexible stays described in Specifications No. 15,547, A.D. 1894, Nos. 2533 and 10,728, A.D. 1902, [*Abridgment Class* Steam generators], and No. 7607, A.D. 1905.

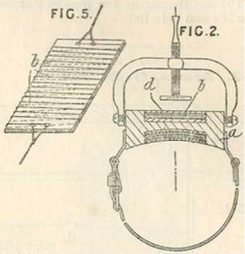
19,875. Nobbs, C. G., and **Nobbs, C. G.** Sept. 5.

Heating buildings; heating by electricity; heating water.—In an electrically-heated water radiator for buildings &c., one or more annular cylindrical heating-elements *a*, a^1 insulated from the water are arranged in the lower horizontal limb *b* of the radiator. Each element may consist of an outer tube *c* and an inner tube *d* open at one end. Passages c^1 connect the interior of the tube *d* with the lower part of the limb *b*. The heating-resistance is wound on the tube *d*. An evaporating-basin *f*, open to the atmosphere, is connected directly with the water circulation of the radiator.

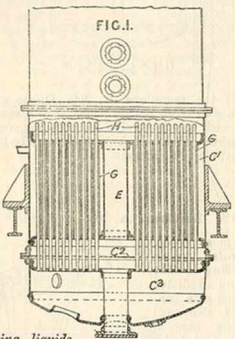


19,907. Hay, J., Couper, H. R., and **Lindsay, W. H.** Sept. 6. *Right to Patent relinquished.*

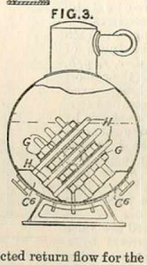
Heating by electricity.—A vulcanizer, particularly for tyres, is constructed by embedding in a block of wood or other non-conducting material *a* one or more brass, copper, &c. heating-plates *d*, beneath which is placed a resistance coil *b*, preferably of mica round which a bare wire is wound. A sheet of mica &c. is placed on one or both faces of the heating-coil *b*, and may be provided with holes to facilitate radiation of heat to the heating-plate *d*. A sheet of asbestos or other yielding non-conductor is placed at the bottom of the recess in the block *a*, under the heating-resistance *b*.



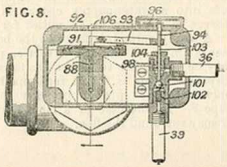
20,003. Dunn, J., and **Dunn, F. M.** Sept. 7.



Heating liquids.—Relates to vacuum pans of the tubular type for the evaporation or concentration of liquids, or for condensing, heating, and distilling purposes. In apparatus wherein the liquid to be heated flows in thin films between pairs of concentric tubes which are heated by steam and are fitted in perforated partitions, an unrestricted return flow for the liquid is provided. In the arrangement shown in Fig. 1, the liquid flows from the chamber C^3 up the annular space between the concentric heating-tubes G, H, and returns by the large central circulating-pipe E. The outer tubes G are heated externally by steam in the chamber C^1. The inner tubes H, which extend upwards from the steam chamber C^3, may be closed at their upper ends, or they may have a small opening therein for the escape of non-condensible gases. In a modification, the upper ends of the inner tubes terminate in a steam dome, which may be provided with a pipe to permit a free flow of steam. Fig. 3 shows an arrangement in which the inner steam pipes H extend from side chambers C^6 through outer pipes which traverse a steam chamber G.



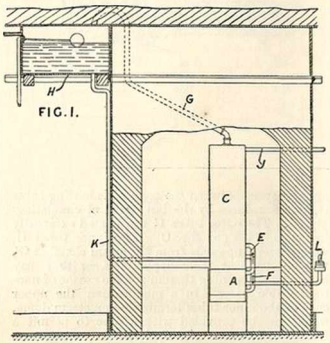
20,112. Boult, A. J. [*Goldman & Co., E.*]. Sept. 9.



Thermostats.—In sterilizing-apparatus in which the heating-water &c. is circulated through a heater by a pump, the steam-supply to the heater, in the form of a jet-pump, is controlled by air-pressure in a pipe 36. The air supply is controlled by a thermostat, which may comprise a tube containing ether &c. placed in the water circulation and ending in a neck 88 leading to a casing 92 and opening under a diaphragm 91 in contact with a lever 93 adjusted by a threaded rod 94 having an index 96 and touching a rod 103 resting on a ball-valve 101 in a head 98. When the temperature exceeds the limit, the diaphragm 91 opens the valve 101 and air passes from a supply pipe 39 to the pipe 36. When the temperature falls, the valve 101 is closed by a

spring 102 and the air in the pipe 36 escapes by a passage 104 and hole 106.

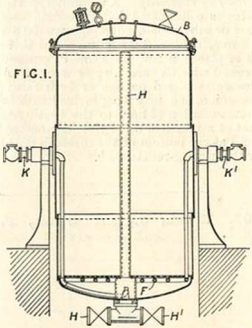
20,132. Brown, G. B. Sept. 9.



Heating water.—The hot-water reservoir C of a boiler A is placed on the boiler itself and extends up the flue. The boiler and the reservoir, which may be made in one piece, are connected by flow and return pipes E, F at different levels to promote circulation. An expansion pipe G extends from the top of the reservoir C to a sufficient height to give a suitable head of water for the supply, and then leads into a water-supply cistern H. The pipe G serves in addition as an outlet for steam and air. A safety-valve L is fitted to the boiler A. Hot water is drawn off through a service pipe J, which may be connected to either the reservoir C or the expansion pipe G. The feed-pipe K from the supply cistern H preferably leads into the return pipe F. In the case of a close stove, the reservoir may surround the flue.

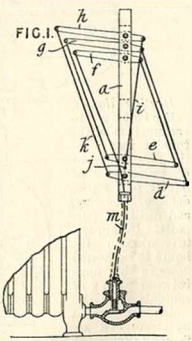
20,268. Hutchinson, T. J., and **United Railway and Trading Co.** Sept. 11.

Digesters; boiling-pans.—A digester or boiling-pan, heated by steam and provided with a central vertical pipe H through which liquid is thrown up by steam, is mounted on horizontal trunnions K, K^1, and may be provided with a cover B, which, when removed, opens the whole of the top of the digester. The digester is then turned over by worm gearing, and its contents are bodily discharged, but the digester may be placed near a wall which obstructs the opening so as to prevent free discharge until the digester has passed the horizontal. Several digesters may be disposed in a range, their upper ends passing through openings in a charging-floor from which they are fed with material. The floor below is provided with suitable drains. Steam for the central pipe and a heating-coil F is supplied



through the trunnions K, K^1. Discharge cocks H, H^1 are fitted to the digester. The cover is provided with a safety-valve, a pressure gauge, and any desired cocks. Such digesters may be used for the treatment of bagasse.

20,339. Barker, A. H. Sept. 12.

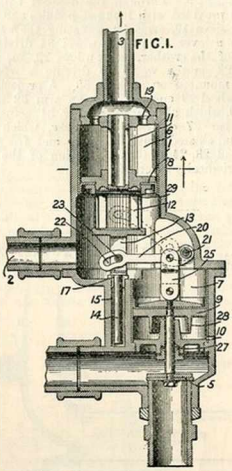


Thermostats.—A thermostat for controlling a lift valve on a radiator or steam-pipe consists of two steel or brass bars *a* connected by distance-pieces, and carrying at each end the fulcra of levers *d*, *e*, *f*, *g*, *h*, having their short and long arms connected alternately as shown by brass or steel wires *k*. The short arm of the uppermost lever *h* is connected by a wire *i* with a fixed point *j* on one of the bars, and the valve is connected by a Bowden connexion *m* with the long arm of the last of the series of levers *f*.

20,486. Pitcher, T. W. Sept. 20, 1906, [*date applied for under Patents Act, 1901*].

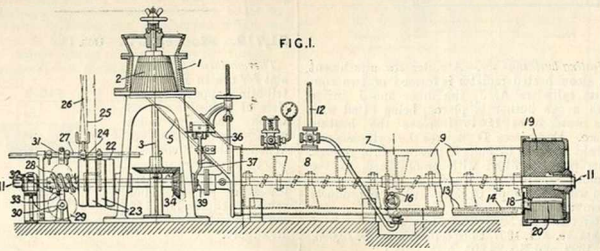
Heating water.—In a valve mechanism of the type described in Specification No. 7739, A.D. 1905, for automatically controlling the supply of fuel to a water-heater by the flow of water therethrough, the casing 1, through which the water passes to or from the heater, is provided with two parallel cylinders 6, 7, having corresponding pistons 8, 9 which expose equal effective areas to the water pressure. The annular piston 8 slides on a slotted tube 11, and is guided by a plunger 14 which slides in a compartment 15, the plunger and piston being connected through a frame 12, 13. Water passes in and out of the chamber 15 through a slot in the side of the bush 17. The piston 9, to which the fuel valve 5 is connected, is secured by a link 25 to a lever 20, pivoted at 21, which by means of a slot 22 engages the pin 23 on the frame 13, the movement of the piston 9 being thus less than the corresponding movement of the piston 8. A drip guard 28 on the underside of the piston prevents any water that has leaked past the piston from passing through the gland 27 to the fuel-supply pipe. In action, when the water is passing in at 2 and out at 3, the difference of pressure on the two sides of the piston 8 causes it to move upwardly, thus opening the fuel valve 5 through a lever 20. On the cessation of the flow of water the pressure on both sides of the piston 8 is equalized, and the pressure above the piston 9 closes the valve 5. A hole 29 serves to establish communication between both sides of the piston 8 when this is in its lowest position, as shown, and an air-hole 10 is provided in the casing under the piston 9. Passages 19 are arranged in the end of the chamber 6.

FIG. I.



20,827. Wyssling, W. Sept. 19.

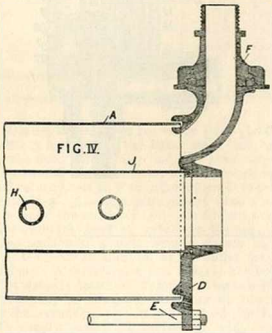
FIG. I.



Digesters.—Relates to apparatus for crushing, drying, slaking, and sifting lime, in which all the devices are operated from one shaft. The lime is first crushed by a fluted cone 2 in a casing 1, whence it passes by a shoot 5, in which is a sifting-plate 36, to a digester 7 made in two compartments 8, 9 for slaking and drying the lime respectively, communicating by a sliding door 16.

The compartment 7 is supplied with steam by a pipe 12, a branch from which passes to a serpentine pipe 14 in the double bottom 13 of the compartment 9. Through the digester 7 passes a shaft 11 provided with inclined paddles and carrying the sieve 19, arms 39 actuating the sifter 36 through a lever 37, a bevel-wheel 34 driving the shaft 3 of the crusher, fast pulleys 22, 24, a loose pulley 23, and a worm 28 driving a wheel 29 loosely mounted on a shaft 30. A projection 33 on the wheel 29 engages with an arm 32 on the shaft 30, which also carries a lever 31 actuating a sliding bar 27 carrying belt forks, which shift direct and crossed belts 25, 26 to and fro on the pulleys 22, 23, 24, so that the motion of the shaft 11 is periodically reversed.

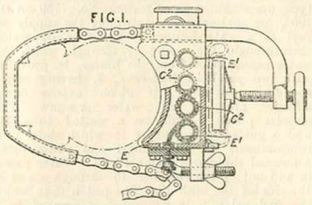
21,071. Price, H. A., and **Turner, H. C.** Sept. 23.



Heating buildings &c.—A boiler for attachment to a steam-heated radiator is formed of two concentric cylinders A, J, the inner one J, inside which a gas burner is placed, being fitted with cross water-tubes H to increase the heating surface. End pieces D fit over the cylinders and are held together by bolts E passing through lugs. Steam pipes F fitted with unions lead to the radiator. One end of the inner casing may be fitted with a flue pipe to carry away the products of combustion.

[Reference has been directed under Section 7 of Patents &c. Act, 1907, to Specifications No. 19,095, A.D. 1892, and No. 22,603, A.D. 1906.]

21,332. Welch, W. H., and **Frost & Co., H.** Sept. 26.



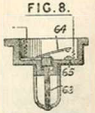
Heating by electricity; heating water.—An apparatus for vulcanizing tyres or tyre tubes is heated electrically by resistances immersed in water or other liquid contained in the apparatus. The form of apparatus shown is of known construction for use with a lamp, being provided with flues E^1 in a hollow mould E; the electric resistance is a wire C^2 insulated by glass beads and coiled around the flues. A current-regulating switch may be provided, and may act automatically.

21,702. Solomon, W. V. Oct. 1. *Drawings to Specification.*

Non-conducting coverings.—A portable non-conducting mattress for cold-storage or freezing chambers is made up of layers of hair felt, asbestos, or silicate cotton, placed between layers of waterproof paper, and is covered with a canvas sheeting, studded at intervals. Flaps provided with eyelet holes are attached to the front and back edges of the mattresses, so that a number of mattresses may be laced together, and the free edges nailed to a bulkhead or floor.

21,712. Moore, E. J. Oct. 1.

Thermostats.—A thermostat for use in liquid-distributing apparatus consists of a fusible rod 63 which normally holds apart contacts 64, 65. When these contacts coact, an electro-magnet is energized, which releases a pressure-relief valve and causes liquid in connexions to return to the supply.

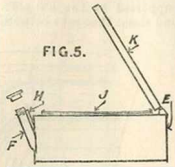


21,893. Woodcock, C. E. Oct. 4.

Heat-storing apparatus.—A dental rubber-heater

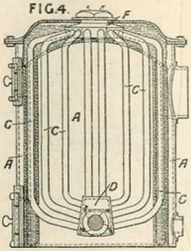
consists of a tank E into which boiling water is poured through a filler F, air escaping through an outlet H. The rubber is placed upon the top of the tank or upon a sheet of glass J. A lid K is also provided.

FIG.5.



21,929. Holdsworth, H. S., Holdsworth, A. S., and **Holdsworth, P. F.** Oct. 4.

FIG.4.



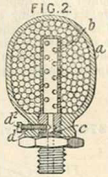
Heating water.—An iron double-shell boiler A, supplying water for heating purposes, contains a copper-tube heater for water for ordinary domestic purposes, consisting of a series of tubes C of round, oval, or other section, extending from the sides and tops of two inlet distributing-boxes D through the waterway of the iron boiler to a hot-water collecting-box F, situated within and secured to the detachable dome of the iron boiler. The copper heater may otherwise be formed of sheet metal with division pieces.

22,036. Lake, W. R., [*Michaud, G.*, and *Delasson, E.*]. Oct. 5. *Drawings to Specification.*

Heating by electricity.—Filaments which can be made incandescent in air by electricity, for heating, are made by passing horizontally through an electric furnace and thereby bringing to a state of pasty fusion, crude filaments, obtained by pressing a mixture of alumina, magnesia, silica and lime, singly or in combination, and thoria, ceria, or rare earth oxides, with black soap as a binder; the filaments have in addition a refractory conductive core of carbon, vanadium, tantalum, osmium, or other material.

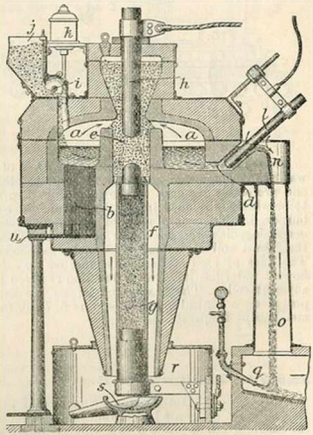
22,089. Revy, J. W. Oct. 7.

FIG.2.



Heating water.—A silent steam-boiling nozzle is provided with a screw needle valve *d* at right-angles to the bore *c*, whereby the steam outlet can be throttled for use with varying steam pressures. The head of the screw *d* has a slot d^2, which by its relation to markings on the outer casing *a* indicates for what pressure the nozzle is set. In the form shown, the steam passes into a perforated tube *b*, screwed into an outer perforated casing *a*, the intervening space being filled with shot. According to the Provisional Specification, more than one adjusting-screw may be used; the graduation marks may be on the screw or other device instead of on the outer casing; and iron, steel, copper, brass, gun-metal, lead, tin, aluminium glass, porcelain, china, and stone are mentioned as suitable materials from which the nozzle and regulating-device may be made.

22,283. Cote, E. F., and **Piérron, P. R.** Oct. 9.



Heating by electricity.—An electric furnace for the distillation of zinc has a condenser electrically heated to a regulable extent as described in Specification No. 5100, A.D. 1907. Vapour from

the annular furnace bath passes through a concentric chamber *e* filled with carbon which is supplied by a hopper. An electrode *h* conveys current for heating the carbon and the condenser, and is adjusted when the hopper is replenished. The condenser *f* has a central refractory tube *g* filled with carbon or graphite powder more compressed above than below.

22,370. Taylor, W. M. Oct. 10.

FIG.1.

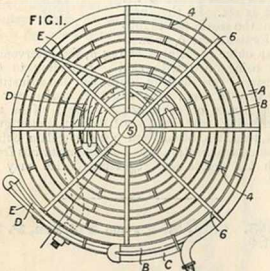
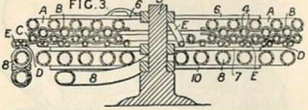


FIG.3.

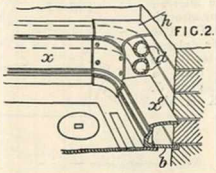


Heating water &c.—The coils A, B, C, D, E of a water heater or steam generator are close together and preferably arranged as shown in Fig. 3 so as to be wholly enveloped in the flame from the coil burner 8. The tubes may be of progressively decreasing diameter the nearer to the burner, and the lowest coil D, E may be double, as shown. The ends of each coil are so connected that the flow of water has its circular direction reversed in adjacent coils. The heater and burner are supported on a central pillar 5 by arms 6, 7, 10, and metal strips 4 separate the coils.

22,587A. Phillipson, B. R. Oct. 14.

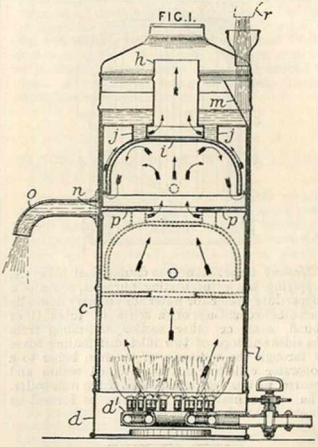
Heating water.—Hot-water pipes connected to a kitchen-range boiler are laid behind the skirting of the range, which is made with a wide moulding to leave sufficient space. The side skirting x^1 may be lower than the back skirting x so that the pipes d are partly exposed, and rounded angle-pieces h may be used, to avoid sharp bends in the pipes. The pipes may rest upon a metal strip b, which is supported by the hot-plate and the flue settings and closes the space between them.

FIG.2.



22,631. Fildes, T. S. Oct. 15.

FIG.1.

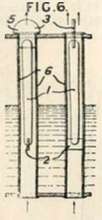


Heating water.—A water-jacketed geyser contains one or more dome-like water vessels *i*, which are connected to the surrounding water-jacket *c* by horizontal tubes near the bottom extremities of the domes, and either to a water reservoir at the top of the geyser or to horizontal waterway flanges *p* by vertical tubes *j* from the tops of the domes. The products of combustion from a gas burner d^1 have to pass under the edges of the domes and through the central openings in the flanges *p* to the flue *h*. Water supplied by a tap *r* flows through a funnel *m* down a flattened waterway *l* to the bottom of the water-jacket *c*. The hot water overflows into a waterway *n* open at the top and closed at the bottom, conveying it to the outlet *o*.

22,771. Lagosse, E. Oct. 20, 1906, [*date applied for under Patents Act, 1901*].

Heating air; heating water.—Conical rods 1, for use in the tubes of tubular heaters, made either hollow or solid, smooth or stepped, are provided with flat guides or supports 2, 3, secured to or made in one piece with the ends of the rod. Those supports 3, which are at the upper or outer ends of the tubes, have shoulders 5, to prevent them from being drawn in too far.

FIG. 6.

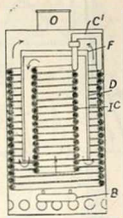


22,869. British Thomson-Houston Co., [*General Electric Co.*]. Oct. 16.

Heating by electricity.—Purified and fused alumina, known as "alundum," is used as a non-conducting constituent of resistances for car heaters. Specification No. 11,146, A.D. 1905, is referred to. The alundum may be mixed wet with a binder, such as fire-clay, and a small proportion of a conducting material, such as graphite, and optionally with feldspar and flint, the mixture being shaped, dried, and baked at a temperature of 1100–1300° C. The resulting bodies may be enamelled, and may be provided with contact surfaces by carbonizing, copper-plating, or shrinking on metal caps.

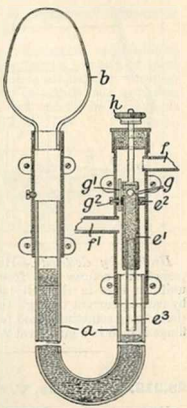
22,930. Sweet, A. Oct. 17.

Heating water.—A water-heater for use on a high-pressure water supply is formed of two concentric helices of tube I^c, which communicate with each other at the top through a junction piece C^1. Specifications No. 2180, A.D. 1878, No. 13,957, A.D. 1885, Nos. 2075 and 13,064, A.D. 1886, and No. 24,108, A.D. 1897, are referred to. A burner B, of less diameter than the inner coil, is situated under the heater, and the heated gases, after passing up the inner coil, strike against a metal cylinder F which causes them to pass down outside the inner coil, and up inside the outer coil, the gases finally escaping through an outlet O. The Provisional Specification describes also an automatic gas valve for use with the above heater. A plunger situated in the water-supply pipe is lifted when the water is turned on, and a rod, attached to the plunger and working through a stuffing-box, strikes and forces upwards the stem of a valve in the gas-supply pipe. The gas valve is weighted so that when the plunger falls the gas valve closes by its own weight. The stroke of the plunger is arranged to fully open the gas valve before the water passage is entirely open.



23,016. Horne, C. H. Oct. 18.

Thermostats.—Relates to thermostats of the type in which the variations in volume of a body of fluid in a bulb *b* exposed to the atmosphere cause, through the medium of mercury in a U-tube *a*, the opening or closing of a dip-pipe e^3 forming communication between the supply pipes *f*, f^1 leading to the gas heating-apparatus. The pipe e^3 is carried by a tube e^1 screw-threaded through the partition e^2 and having apertures *g*. The effective size of these latter apertures may be adjusted by varying the height of the tubes e^1, e^3 by means of a milled head *h*. A by-pass tube g^1 extends through the partition, and the flow of gas through it can be regulated by a set-screw g^2.



23,054. Lake, H. W., [*Plant Co.*] Oct. 18.

FIG. 2.

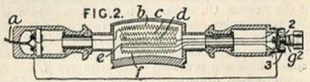
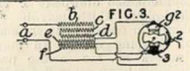


FIG. 3.



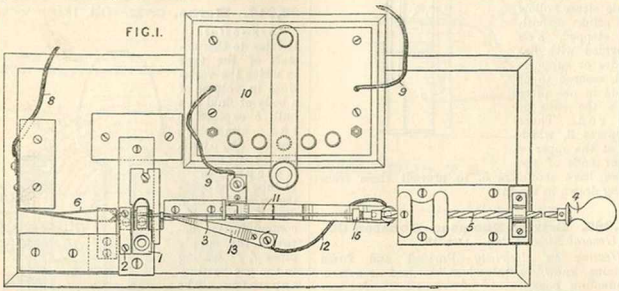
Heating by electricity.—A boot &c. treeing iron heated by electricity is provided with a series of resistances which can be put into and out of circuit to regulate the temperature. The iron is of the usual form, and is connected to the electric supply by leads *a*. In the arrangement shown, five sets of resistances *b*, *c*, *d*, *e*, *f* are used, the first three being normally in circuit. By turning the switch g^2 into the successive positions 2, 3, the resistances *e*, *f* may be brought into circuit. Fig. 3 shows diagrammatically the arrangement of the circuits.

23,093. Müller, E. Oct. 19.

Non-conducting coverings and compositions.—A mouldable composition for insulation &c. is made by mixing asbestos with oil containing phenol, such as creosote oil, phenol oil, &c. and with asphalt, pitch, or the like. The mass is pressed and baked. Other materials may be embedded in, or used to face, the mass, and the finished product may be sawn, carved, &c.

23,198. Streich, R. Oct. 21.

FIG. 1.

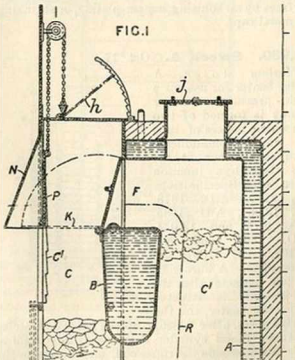


Heating by electricity.—Hinge-pin bearings in pianoforte actions are formed by inserting a uniform wire in the felt bushing and heating it by passing current through the wire, the hinge-pin itself being sometimes used for this purpose. The flinge is held in a guide-rest 2, and the needle 3 is pushed forwards by a handle 4 and rotated by a screw 5, and engages spring terminals 6. A spring switch 11 is subsequently closed by the action of a shoulder 15, and completes a circuit through the needle 3 and regulating-resistance 10.

23,212. Newcome, V. N. Oct. 21.

Heating water. — Separate water - circulating systems for warming buildings and for supply purposes are respectively connected with boilers A, B, heated by two grates C^1, C, the former being arranged behind the other, which may be either an open or closed domestic fire-place. The boiler A is ∩-shaped in plan and forms the sides and top of the firebox C^1, while the boiler B is substantially rectangular and is placed between the two fire-boxes. A hinged plate K normally closes the upper passage F between the two grates, the flues from which are provided with dampers *j*, *h*. A counterpoised drawplate P and a double-walled dead-plate, which may be placed vertically, as shown in dotted lines, are added for the purpose of damping down. In normal operation, the dampers &c. are in the positions shown, the draughts being controlled as desired by dampers *h*, *j*. To feed the inner grate, the canopy N is removed, the drawplate is drawn down, and the door K opened to enable the fuel to be thrown in through the passage F. At night the damper *h* is closed and the drawplate and dead-plate placed in position to damp down the grate C^1. In warm weather the boiler B may be heated by a gas or oil burner, a baffle R being inserted to guide the combustion gases along the back of the boiler.

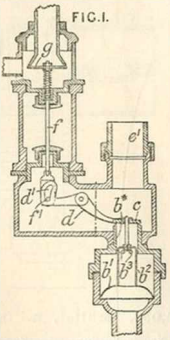
FIG. 1



23,457. Fletcher, Russell, & Co., Neil, A., and **Fletcher, T. W.** Oct. 24.

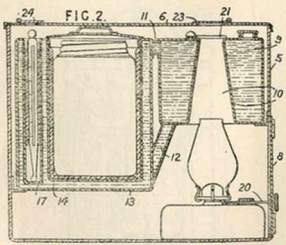
Heating water.—In a device for controlling the gas supply to geysers or like water-heaters by means of the water supply, the gas supply is regulated by a spring-pressed lift valve *g* connected through a rod *f* and a pin f^1 to a slot d^1 at one end of a pivoted lever *d*, the other end of which has a plate *c* covering the water outlet *b*. The plate *c* is raised to operate the gas valve by the inflowing water raising a hollow perforated piston b^2 having a concave part b^1 which also allows the water to flow through perforations b^2 to the water outlet e^1 and thence to the heating-coils. When the water supply is cut off, the weight of water in the outlet pipe is sufficient to cause the apparatus to cut off the gas supply.

FIG. 1.



23,513. Seeland, J. C. Oct. 24, 1906, [*date applied for under Patents Act, 1901*].

FIG. 2.



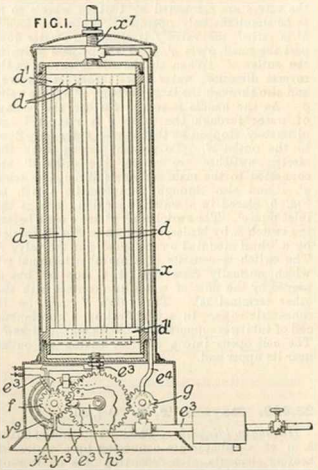
Heating liquids.—Apparatus for use in the breeding of live stock consists of a receptacle for the male generative fluid constructed to retain the fluid in a fecund state for a long period so as to permit of transport. The apparatus consists of a casing 5, formed with a hinged lid 6, and a door 8, and containing two water receptacles 9, 13, communicating by means of pipes 11, 12. The receptacle 13 is provided with a well 14 to receive a jar containing the semen, and with a tube 17 to receive a thermometer; the other receptacle is heated by means of a lamp 20 and is provided with a flue 10 of which the top opening is adjusted by a two-part pivoted shutter 21. The lid 6 of the casing is provided with openings having lids 23, 24, through which the shutter may be regulated and the thermometer withdrawn respectively.

23,778. Day, C. A., [*Fabrik Elektrischer Zünder Ges.*]. Oct. 28.

Heating by electricity.—Resistances applicable as heating bodies are made from a mixture of good and bad conductors, which is subjected to an electric influence, to direct or adjust the particles, during the continuance of which the mixture is caused to set or solidify.

23,801. Condon, E. J. Nov. 1, 1906, [*date applied for under Patents Act, 1901*].

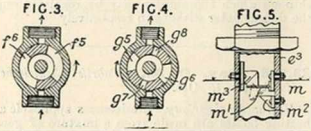
FIG. 1.



Heating water.—In an electric water-heater, the liquid is heated in its passage through and around pipes *d* which conduct electricity from a lower conducting-support d^1 to a similar upper support. The tubes and supports, which may be disks formed of carbon, are enclosed in an insulated shell *x* having end covers, which form with the supports d^1 water chambers. Water has access to

the spaces between the tubes through perforations in the disks d^1. The main water-supply pipe e^3 is provided with a by-pass e^4 leading around, but not in contact with, the heater element to the outlet x^7. The by pass is within the outer casing of the

FIG.3. FIG.4. FIG.5.

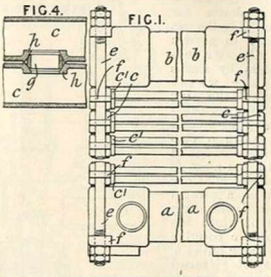


heating-apparatus. Valves f, g, in the supply pipe and by-pass respectively, are interconnected so that the water that at first passes through the heater is mixed with cold water flowing through the by-pass, thus preventing a sudden delivery of scalding water. The valve f, shown in Fig. 3, has two ports f^5, f^6 of uniform width from end to end in the plug. The valve g, shown in Fig. 4, has also two large ports g^5, g^6 which taper from end to end, and also two smaller ports g^7, g^8. The spindles of the valves are connected by toothed wheels so as to be simultaneously operated. When the handle h^3 is raised, the valve f is closed and water flows past the small ports g^7, g^8 of the by-pass valve to the outlet x^7. When the handle is turned in the reverse direction, water flows through the valve f and also through the large ports g^5, g^6 of the valve g. As the handle is turned further, the passage of water through the valve g is restricted and ultimately stopped so that heated water only flows to the outlet x^7. To prevent arcing when the electric switches are closed, the disks d^1 are connected to the main terminals through switches y^3, y^9 and also through an automatic switch m, Fig. 5, placed in a water connexion, such as the inlet pipe e^3. The switches y^3, y^9 are closed before the switch m by blades, as shown in Fig. 1, carried by a wheel mounted on the spindle of the valve f. The switch m consists of a movable terminal m^1, which normally rests against a stop m^2 but is moved by the flow of water into contact with the other terminal m^3. The tubes d may be in concentric rows. In a modification, a continuous coil of tubing is supported by blocks on the disks d^1. The coil opens into a cylinder having an outlet near its upper end.

23,993. Rayner, T. J. Oct. 30.

Heating buildings &c.—The inlet and outlet boxes b, a of a radiator are connected by a series of heating elements, each consisting of a number of pipes connecting two headers c, c^1. The elements are superposed and held in position by bolts e passing through lugs f on the boxes and headers. Successive pairs of elements have their headers connected alternately at each end of the radiator by short coned ferrules g fitting into similarly coned openings h in the headers, so as to form water-tight joints when the nuts on the bolts e are screwed down. The radiator is stated to be applicable for heating purposes, although its primary use is for cooling the circulating water of internal-combustion engines.

FIG.4. FIG.1.

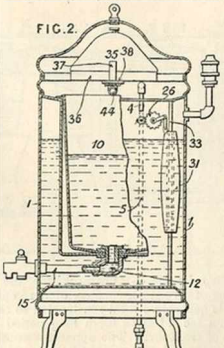


24,052. Müller, R. Oct. 31.

Non-conducting compositions.—To a mixture of asbestos and asphalt or pitch are added oils containing phenol, such as creosote oil, phenol oil, and crude benzol. The mass is finally pressed and baked. The product is an insulator of electricity and heat; is proof against fire, water, alcohol, and acid.

24,116. Jones, W. C., [*Williams, W. J.*]. Oct. 31.

FIG.2.



Heating water.—In a coffee urn comprising a boiler 1 from which water is supplied under steam

pressure through a pipe 44 to a percolator 35, from which the coffee passes to an air-jacketed receiver 10, water is supplied to the boiler by a pipe 5 having a plug-valve actuated to maintain a constant supply through gearing 26 by a float 31, preferably guided upon a rod 33.

24,150. Saunders, S. Nov. 1.

FIG.1.

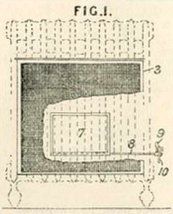
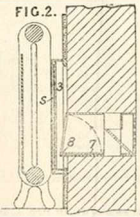


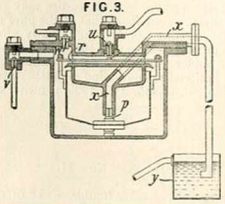
FIG.2.



Heating buildings &c.—Relates to ventilating arrangements used with fixed heat radiators in which an air-inlet fitted with a regulating-valve is fixed at the back of the radiator. In front of the wall box is secured a grooved frame 3 in which slides a filtering-screen S. The flap valve 7 is mounted on a spindle 8 which carries an arm 9 working in a slotted sector 10. In a modification, the flap valve moves on a vertical axis. Specification No. 4349, A.D. 1906, is referred to.

24,209. Scholl, A. Nov. 1.

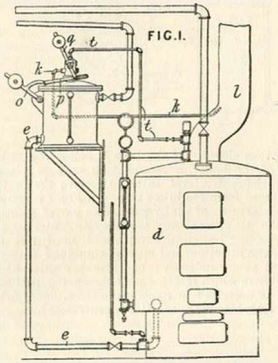
FIG.3.



Heating buildings; heating by steam circulation.—Air is withdrawn from steam heating-installations by means of automatic apparatus worked by water under pressure. Fig. 3 shows the apparatus for exhausting the air. Within a casing, an open-topped float carries a valve *p* controlling the outflow of water through a siphon pipe *x*, which passes out of the casing and dips into a tank *y*. In the initial position, the casing, the float, the pipe *x*, and the tank *y* are filled with water, and the float is at its lowest position so that the valve *p* is open. As the water escapes through the pipe *x*, air is drawn into the apparatus past the valve *v* and the float, which is still surrounded by the water in the casing, rises. Ultimately the valve *p* is closed, and the water-inlet valve *u* is opened by contact with a projection on a cross-bar *r* carried by the float. Water then flows into the space around the float and drives the air out past the valve *w*. The water overflows into the float, which in time sinks, restoring the apparatus to its initial position. A valve operated by a rise in temperature may be placed in front of the apparatus to prevent steam from being withdrawn with the air.

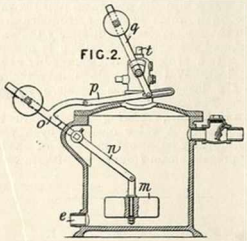
24,224. Nesbit, D. M. Nov. 1.

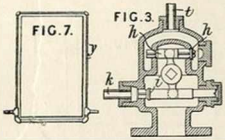
FIG.1.



Heating buildings &c.; steam traps.—In a steam heating-system working at or above or below atmospheric pressure, the return pipe of the system is connected by a non-return valve with a steam-trap or similar receptacle, from which a pipe passes to a flue, to discharge air. The heating-system used may be of the type described in Specifications No. 12,944, A.D. 1902, Nos. 12,850, 12,852, and 27,687, A.D. 1904, No. 17,791, A.D. 1905, and No. 17,339, A.D. 1906. The pipe may be provided with means operated by the waste heat or heated gases to increase the suction. The steam-trap used is preferably of the type described in Specification No. 25,234, A.D. 1902, in which a float *m*, Fig. 2, moves a system of levers *n*, *o*, *p*, *q* when water collects, and opens a valve *h*, Fig. 3, in a chamber above the trap, admitting steam from a boiler *d* through a

pipe t, and equalizing the pressure, so that the water decends by its own weight through a pipe e to the boiler. The trap is connected by a pipe k with the boiler flue l except when the float rises, a valve i

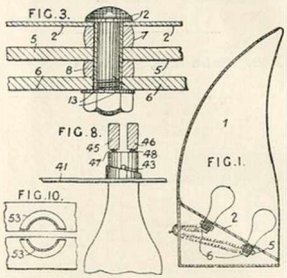




being then closed. If the trap is below the water level of the boiler, a second trap may be placed above the water level, so as to receive the water discharged from the lower trap. In Fig. 7 is shown an arrangement of air by-pass pipes y over a doorway &c. to prevent any tendency to water or air hammer. The steam trap used need not be automatic in action, and may be combined with or formed as a condenser; or it may consist of a chamber in which is fitted a baffle having perforations as described in Specification No. 9646, A.D. 1902, [*Abridgment Class* Steam generators].

24,550. Fennell, W., and **Perry, W. P.** Nov. 6.

Heating by electricity.—In an electric radiator or stove the lamps are placed in direct contact with bus bars and may be in staggered rows on a sloping plain or stepped reflecting surface, provided with holes for the circulation of air, and arranged so that the heat is reflected away from the lamps and lamp-holders. The lamps may be supported by the bus-bars 5, 6, Fig. 1, which are insulated by bushes 7, 8, and washers 12, 13, Fig. 3, and fixed behind a sloping reflecting surface 2, the holes through which the lamp-holders are inserted being enlarged so as to circulate the air. The reflector 1 is curved as shown to project the heat into the room, and the lamps are arranged in staggered form so that the hot air from the lamps in one row misses the lamps in the next row. The reflector may be inverted so that the lamps project downwards. The bus-bars may consist of concentric tubes, the radiator being cylindrical in shape. The lamps may have screw



caps, as shown in Fig. 1, or may have two contacts 47, 48 on the cap bearing against with the bus-bars 45, 46 as shown in Fig. 8, the lamp being supported on inclined edges of the reflector 41 by lugs 43. Semicircular sockets 53 may also be used on the bus-bars, as shown in Fig. 10.

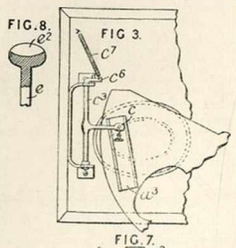
24,707. British Thomson-Houston Co., [*General Electric Co.*]. Nov. 7.

Heating by electricity.—Electric-resistance bodies applicable for heaters, composed of a refractory metal with a small addition of silicon, are made by introducing the metal and silicon into a plastic binder, shaping, and treating to remove the binder and sinter the residue. Such bodies may have a resistance three or four times that of the pure metal, without the melting point being greatly affected. Tantalum or tungsten may be the metal employed; and the binder may be a cadmium-mercury amalgam, optionally containing a little bismuth. Specification No. 18,485, A.D. 1906, is mentioned.

24,898. Francis, A. Nov. 11.

Heating water and other liquids.—The invention consists in improvements in the apparatus for automatically heating and emptying a kettle, described in Specification No. 15,170, A.D. 1902. In order to allow the match socket c to be retained when desired in a position away from the striker a^3, the rocking bar c^3 has an arm c^6 at its end connected to the base-board by a spring c^7. In the pivoted arm c, Figs. 7 and 8, which keeps the kettle

horizontal, the groove e^2 is made concave along its length, and narrowed at its ends, as shown, to



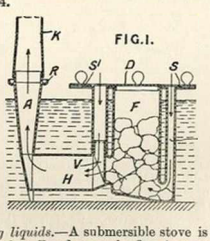
prevent the wire *f* from being accidentally disengaged.

25,071. Bartels, M. Nov. 12.

Non-conducting coverings and compositions.—A composition for use as a non-conductor of heat consists of glycerine, water, gelatine, and a mixture of formaldehyde and talc, to which may also be added potassium chromate.

[Reference has been directed under Section 7 of Patents &c. Act, 1907, to Specifications No. 109, A.D. 1871, [*Abridgment Class* Cutting &c.], No. 19,163, A.D. 1893, Nos. 15,534 and 23,056, A.D. 1897, [*Abridgment Class* India-rubber &c.], and No. 15,907, A.D. 1906, [*Abridgment Class* Cements &c.].]

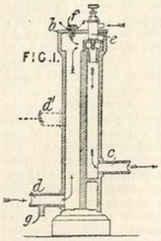
25,282. Downing, G. C., [*Szpor, L.*]. Nov. 14.



Heating liquids.—A submersible stove is formed with a fire-box F and a smoke flue A connected by a series of heating-tubes H, which may be bent, coiled, or corrugated. The fire-box F is closed by a lid D, and is supplied with air by a rectangular tube. A second rectangular air-tube leads into a grid-like air distributor V formed of pipes extending across the passage to the heating-tubes H, and thus provides for the complete combustion of the gases passing from the fire-box. Dampers S, S^1 control the supply of air. A chimney K fitting over the flue A is preliminarily heated by fuel in an annular receptacle R to create a draught, when it is desired to use the stove, and a burning pad of absorbent material soaked in methylated spirits is introduced into the first air-tube. Otherwise the flue A can be directly connected to a chimney of a room. Liquid or gaseous fuel may be employed with proper burners. According to the Provisional Specification, the air flue and flame flue may be dispensed with, and the heating-tubes may be modified.

25,569. Lees, W., Lees, T. W., and **Lees, A.** Nov. 19.

Heating buildings &c. by mixed steam and air. Steam is passed through an injector *e* into a vertical passage and pipes *c*, and draws in air through an adjustable valve *f*, to regulate the temperature independently of the steam pressure. The injector is connected to the return pipe *d* so that uncondensed steam is re-circulated, and optionally also to an exhaust steam supply d^3. Non-return valves may be provided to allow escape of small quantities of steam and air for moistening purposes. Fig. 1 shows the application to a pipe system, but a radiator is also described, to be supplied with steam only. The valve *f* may consist of a hollow perforated plug, which can be screwed into the cap *b* to expose a varying number of perforations. An outlet *g* for condensation water is provided.



25,655. Seemen, E. von. Nov. 19, 1906, [*date applied for under Patents Act, 1901*].

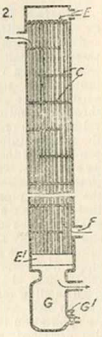
Heating by electricity.—In making resistances which are electrically conductive at ordinary temperatures, refractory oxides such as silica, alumina, magnesia, or lime, or compounds of these, non-conductive when cold, are fused with oxides of metals of the iron group, or with titanium oxide, in the presence of oxygen, to avoid contamination by reduction. The oxygen may be supplied by an oxidizing agent such as saltpetre or in gaseous form. The mixtures may be natural or

artificial, and may contain 15 per cent of iron oxide, 10 per cent of alumina, or 5 per cent of titanium oxide. An electric furnace is preferably used for the fusion. According to the Specification in the original form as published under the Act of 1901, manganese dioxide and zinc sulphate may be used as oxidizing agents; the oxides of metals of the iron group or of titanium may be used alone; the metals may be used and oxidized in the fusion; and bodies of uniform chemical composition but of varying conductivity in different parts may be produced. This subject-matter does not appear in the Complete Specification as accepted.

25,658. Soc. L'Air Liquide (Soc. Anon. pour l'étude et l'exploitation des procédés G. Claude), and **Claude, G.** Nov. 20, 1906, [*date applied for under Patents Act, 1901*].

Heating gases; heating liquids.—Relates to tubular heat exchange apparatus, worked on the counter-current principle. The whole of the liquid outside the tubes is caused to pass over each point of the surface of each tube by baffle plates which have openings C formed in such a manner that the external current follows a helicoidal path. In the arrangement shown, the openings in successive plates are 120 degrees apart. Hot air enters the apparatus by the inlet E and passes to a chamber E^1 communicating with an outlet. Cold gas enters the exchanger by the inlet F and leaves by an outlet at the opposite end of the casing. Moisture draining from the tubes of the apparatus is collected in the chamber G, and is discharged through the outlet G^1.

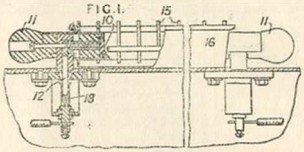
FIG. 2.



25,752. British Thomson-Houston Co., [*General Electric Co.*]. Nov. 20.

Heating by electricity.—An electric cooking-apparatus for broiling or grilling has one or more heating-units 10 on which are mounted transverse metal strips 15. The heating-unit may be of any kind, and has at each end a handle 11 in which is a connecting-plug 12 fitting into a clip or socket 18 on the support. The metal strips 15 are tapered in both directions from the middle, as shown in Fig. 2, and a pan 16 is placed beneath the grid. Two grids of this kind may be used, one being placed above and facing the other.

FIG. 1.



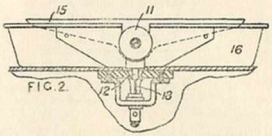
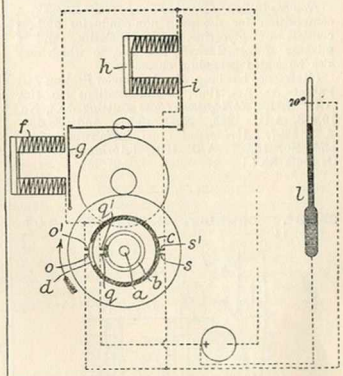


FIG. 2.

25,906. Hohlmann, H. Nov. 22, 1906, [*date applied for under Patents Act, 1901*].



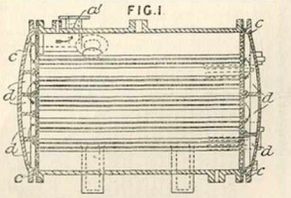
Thermostats.—Relates to an arrangement for automatically regulating the supply of cold water to cooking-boilers for sausages, ham, &c. The spindle *a* of a tap which closes the supply during one half of its rotation, and opens the supply during the other half, tends to rotate always in one direction under the influence of driving-mechanism. The tap is held in its closed position by a stop *g* which engages a fan driven from the

spindle *a*. When the temperature rises too high, the electro-magnet *f*, controlled by a thermometer *l* or the like, is energized, and the stop *g* is withdrawn, the current passing through terminals *o*, o^1, which are in contact with a conducting portion *d* of a ring *c* mounted on the spindle *a*. To prevent the stop *g* from locking the tap in the open position on a fall of temperature, an inner ring *b* mounted on the spindle *a* connects the terminals *q*, q^1 of a circuit which includes the battery and the electro-magnet *f* but not the thermometer. The ring *b* has a conducting portion which corresponds to the insulated portion of the outer ring, so that the electro-magnet holds the stop out of engagement with the fan until the valve is closed. A second electro-magnet *i* is arranged to lock the driving mechanism when the tap has turned through 180 degrees and the temperature has not fallen to the required degree. In the circuit containing the electro-magnet *h*, two terminals *s*, s^1 are included and are connected by the conducting portion *d* of the ring *c*. If when the terminals *s*, s^1 are connected the temperature is still too high, the electro-magnet *h* operates the stop *i* to engage the fan, thus allowing the supply of water to be maintained.

26,014. Comstock, W. A. Nov. 23. *Drawings to Specification.*

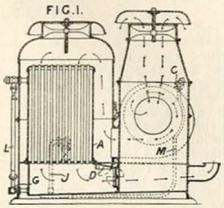
Thermostats.—Furnace draught is controlled by a thermostat and steam-pressure regulator which operate the flue damper and the ash-pit and draught-checking doors.

26,109. Harvey, R. Nov. 26.



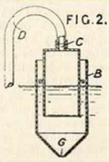
Heating liquids.—A tubular surface apparatus for heating sugar juice or other liquid has pocket chambers at the top of one end of the heater, of which one a^1 is shown in Fig. 1, for the inlet and outlet of liquid, which is circulated through tubes in compartments of the heater by a pump; headers *d* are formed by partitioned dished doors *c*.

26,111. Stewart, A. W. Nov. 26.



Heating air; heating buildings.—Heating and ventilating apparatus, of the kind described in Specifications No. 4783. A.D. 1898, and No. 1904, A.D. 1906, for use on board ship is provided with means for introducing a jet of water into the fan casing so that the air is cleansed from soot &c. A jet of water, which may be sea water or cooled water from a refrigerator, may be introduced by a pipe M which is fitted with a controlling-valve C. The air and spray are projected against the side of the heater A, and the separated water passes through a valve D, so that the air after passing through the heater comes into contact with the water a second time. Water is also admitted to the inside of the heater by a pipe J and leaves the heater by the outlet pipe L. The outlet pipe L is connected to the pipe G leading from the lower part of the tank so that the water discharged under pressure from the heater ejects the water from the bottom of the tank.

26,146. Jones, A. E. Nov. 26.

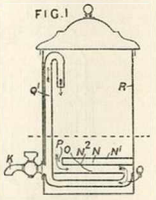


Heating water. — Acetylene or other gas is washed in an apparatus arranged to prevent siphonage of the water back to the generator. The gas to be washed passes by a pipe D to a cylinder C, the open bottom of which is below the water level. An annular space exists between this cylinder and an outer cylinder B open at the top and closed at the bottom, except for a perforation G which acts as a water inlet and refuse outlet; the size of this perforation being less than that of the pipe D, to ensure an air break occurring if siphoning should start. The bottom of the cylinder B is preferably coned, with the perforation G at the apex. The washer is preferably mounted in the gas-holder. The apparatus may be used in feed-water heaters to prevent siphoning back, the pipe D being then the water inlet pipe.

26,397. Luboshey, E., and **Stoddart, J.** Nov. 29.

Heating and cooling water.—A vessel R for heating or cooling water has a shallow chamber O, arranged above an horizontal coil Q and below an upper vessel R, from which it is insulated by an air space N. This air space is formed by soldering disks N^1, N^2 to the sides of the vessel R, a space being left for a connecting-piece. The coil Q is connected at one end to the bottom of the chamber O, and from the other end a pipe Q^1 rises to the top of the reservoir R. A draw-off tap K is provided on the pipe Q^1 near the bottom. The shallow chamber and coil may be formed separately from the upper part and connected to it by couplings. The coil may be serpentine or spiral in shape, and a double coil may be fitted. In the Provisional Specification it is stated that the heating or cooling surface may consist of either the coil or shallow chamber separately, and where the combination is used the water may pass into the coil first.

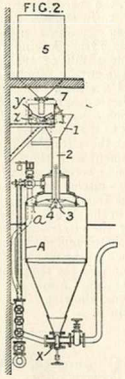
FIG.1



26,583. Pampe, F. Dec. 1, 1906, [*date applied for under Patents Act, 1901*].

Digesters.—Maize or other cereals for preparing distillers' mash is cooked in vessels A supplied in series with steam through centrally placed orifices X at the base of the vessels. A baffle-plate *a* in the upper part of the vessel is provided with a central opening, through which a mixing-device 3, 4 is inserted during the charging of the vessel. The opening is closed by a plate attached to the cover of the vessel while the contents are being cooked.

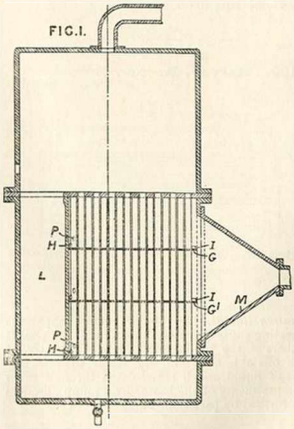
FIG.2.



26,619. Carmichael, J. F., and **Morrow, J.** Dec. 2.

Heating liquids.—In surface apparatus for heating, evaporating, &c., a series of substantially vertical tubes exposed to steam or other heating gas or vapour pass through one or more horizontal diaphragms or other intercepting means, which draw off condensed matter from the tubes between them and prevent it from acting as a heat insulator. Fig. 1 shows a vacuum evaporator containing a stack of tubes, to which steam may be supplied by a conical inlet M, provided with diaphragms G, G^1, which may slope towards condensed-water outlets H or have an edge I of angle-iron. Air and gas outlets P are located above the water outlets H, and a down passage L for the circulating liquid is placed near the coolest part of the heating tubes. The steam is mostly condensed on the tubes nearest the inlet M, which causes brisk circulation of the heated liquid. Instead of employing a conical inlet M, steam may be supplied circumferentially or centrally, or by one or more pipes with numerous orifices, and the diaphragms G, G^1 may be replaced by channel collars with spouts, or by canvas.

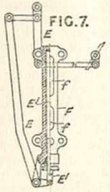
FIG.1.



26,670. Hamill, W. W. Dec. 3.

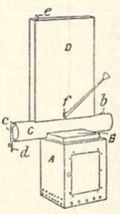
Thermostats. — The temperature of an explosion-engine carburettor is controlled by a system of levers E operated by the expansion of a rod E^1 enclosed in a small chamber F provided with ports *f*. The chamber F is formed integral with or detachably connected to the carburettor so that the rod E^1 is in contact with the heating-medium. Instead of a rod, a liquid, contained between a hollow portion of the rod E^1 and a sleeve in the upper part of the chamber F, may be employed.

FIG.7.



26,992. Smith, E. Dec. 6.

Heating buildings; heating water. — A radiator consists of a heating-box A and containing a gas ring or other source of heat, and a flat boiler B communicating through a water reservoir C with a condenser D. The heating-box A is provided with an outlet for the products of combustion, and may be fitted with a transparent or partly transparent door or panel. The reservoir C is fitted with a filling-cap *b*, discharge cock *d*, and gauge *c*. The condenser is a flat box of sheet-iron having at its top end a small aperture closed by a plug *e*. An outlet *f* may also be provided in the lower portion of the condenser, into which a bronchitis nozzle can be inserted for the purpose of discharging moisture into the air. When the nozzle is not in use, a safety-valve, or a plug serving as a safety-valve, is inserted in the outlet *f*. The boiler and reservoir are filled with water; condensed steam from the condenser D returns to the boiler.



27,024. Aktiebolaget Gasaccumulator. Dec. 7, 1906, [*date applied for under Patents Act, 1901*].

Thermostats.—Gas-valves, especially of buoy and lighthouse lamps, are closed in broad daylight by the unequal expansion of two or more solid, liquid, or gaseous bodies under the influence of radiant heat. The two bodies, or their envelopes are made with a reflecting-surface and a radiant-heat absorbing-surface respectively, or one of the bodies is screened from radiant heat, the bodies being mechanically or electrically connected to a valve or the like in the gas conduit. In one form of apparatus, a central metal cylinder 1, Fig. 1, coated with absorbent material is mounted by pins 9, 10 or the like between a movable upper part 4 and a valve lever 7 in a valve box 6, and other cylinders 2, formed with reflecting-surfaces and concentrically

FIG.1.

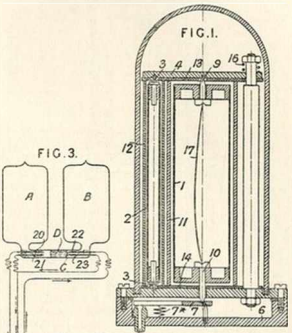
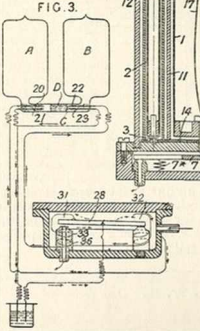
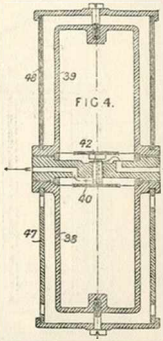


FIG.3.



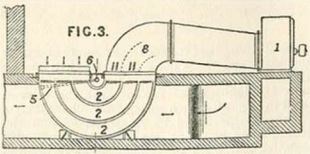
arranged round the cylinder 1, are mounted between the plate 4 and the valve-box 6, so that, on the cylinder 1 expending more than the cylinder 2 under the influence of radiant heat, the valve is closed in opposition to a spring 7×. The cylinders 1, 2 may be protected by tubes 11, 12, and the plate 4 and the valve box may be faced with insulating-plates 12, 14. A spring 17 is inserted between the pins 9, 10, and a spring 16 bears on the top of the movable plate 4. When greatly heated, the cylinder 1 can expand vertically independently of the pin 9. In a second form, two vessels A, B, Fig. 3, formed respectively with absorbent and reflecting-surfaces, are connected by a pipe C having a mercury or other index D which, when the air in the vessels is equally or unequally expanded, connects one of two pairs of contacts 22, 23, 20, 21, so that a valve-lever 28, consisting preferably of a permanent magnet, opens or closes a gas exit 33 under the action of electro-magnets 36, one of which forms part of the gas exit. Contacts 31, 32, against which the ends of the lever bear in their raised positions, are connected to the contacts 20, 22 by coils passing round both electro-magnets, and the valve-lever 28 is connected through the battery to the remaining contacts. Porous or granular plugs prevents the index D from

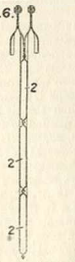
moving too far each way. In a third form, the gas-valve 42, Fig. 4, is operated by the relative expansion of the gas in two chambers 39, 38 acting through diaphragms 42, 40, the chambers 38, 39



being enclosed by opaque and transparent casings 47, 48. The expansion of mercury in pipes may also be employed for the same purpose, or the apparatus shown in Figs. 1 and 2 may be employed for electrically-operating valves.

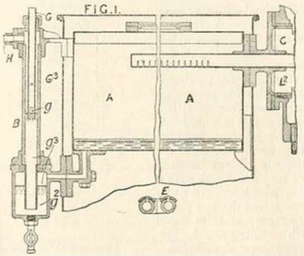
27,126. Wood, W. R. Dec. 7.





Heating air &c.—Air or gas to be heated traverses a curved path between parallel plates, which are surrounded by a heating-medium moving in the reverse direction. For instance, a heater arranged in a flue, for heating the air supplied to a furnace, may consist of semi-circular plates, spaced to form air-passages 2 by channel-iron, or, in the form shown in Figs. 3 and 6, by being stamped and riveted. When the flue is straight, air enters the heater on the side nearer to the chimney; if the heater is placed at a bend in the flue, the air inlet and outlet may be on opposite sides of the bend. Soot may be removed by steam jets issuing from perforated radial pipes 5, which can be turned about a central pipe 6, or by scrapers or brushes. Wire-gauze 11 or other retarding-means may be placed in the air-passages nearer the centre of curvature, to ensure sufficient heating of the air therein, and several heaters may be used in series. Air may be either forced or drawn through the heater by a fan; in the latter arrangement, sections of the heater may be taken out after removal of a section 8 of the delivery tube, without stopping the fan 1. Alternatively, air may pass between the plate sections, and the hot gases through them, the cleaning-means then being inside the sections.

27,145. King, J., and **Workman, H.** Dec. 9.

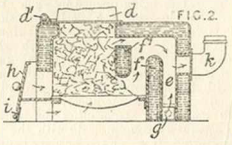


Thermostats.—In a carburetting-apparatus, petrol is maintained at constant level in a vaporizer A heated by a burner E supplied with some of the gas produced, such supply being controlled by the pressure in the vaporizer A through a governor B. The latter may comprise a tube G communicating with the burner E the lower end of the tube G being formed with a hole G^3 and slots g, and dipping into sealing-liquid g^2, the surface g^3 of which communicates with the petrol in the vaporizer A. A pipe H communicates with the gas supply. In a modification, the vaporizer may be connected to a chamber in communication above with the finished gas supply and below with the bottom of the vaporizer, such chamber carrying a float, the motion of which regulates the supply of gas to a tube leading to the burner E.

27,163. Duckworth, H. G. Dec. 9.

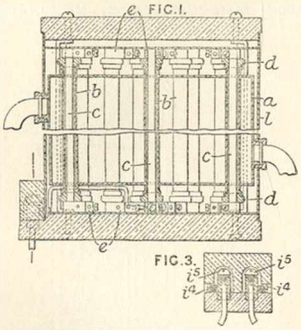
Heating water.—The water jacket and hollow firebridge of a slow-combustion water-heating stove are extended to the ground level, and a second water-bridge, around which the products of combustion pass, may be placed in front of the first bridge. Air for combustion is supplied through

the door h and the damper i and the products of combustion pass over the bridge f and around the supplementary bridge f^1 to the flue k, being damped



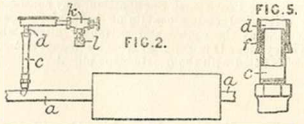
by air admitted to the space e by the inlet g. The conical fuel-container d is hinged at d^1 to facilitate the cleaning of the fire-box.

27,171. Ewart, J. W. Dec. 9.



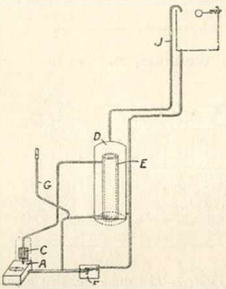
Heating liquids.—An apparatus for heating water or other liquids by the passage of electric current through carbon rods enclosed in tubes is shown in Fig. 1. The carbon rods c are separated by insulating-washers d from their enclosing-tubes b, which traverse a drum a through which the liquid to be heated flows, the whole apparatus being covered by a marble-topped casing l. Spring terminals e are used to grip the ends of the carbon rods, to allow for the difference of expansion of carbon and metal, the rods being connected in series or otherwise by wires between supply terminals, shown separately in Fig. 3. The connecting-wires are held by screws i^5, and the supply wires by set-screws i^4, in sleeves embedded in a marble base. In a modification, the drum a is replaced by upper and lower boxes connected by tubes, through each of which passes a tube enclosing a carbon rod.

27,207. Soc. J. Grouvelle, H. Arquembourg, et Cie. Feb. 18, [*date applied for under Patents Act, 1901*].



Foot-warmers for motor vehicles which can be quickly removed or replaced and which utilize the engine exhaust for heating purposes. Fig. 2 is an elevation of the general arrangement of the device. The exhaust pipe a is provided with a branch c with which the pipe d engages. Several forms of joint between these two pipes, described and shown in the Specification, permit of ready detachment of the foot-warmer. In the form shown in Fig. 5, the pipe c is provided with ring grooves f over which the flared end of the other pipe passes, the joint being similar to that known as a "Swedish joint." The exhaust after passing through a pipe in the foot-warmer may escape direct to the atmosphere or into an escape chamber l. The cover plate of the foot-warmer may be perforated. A valve k is provided which may be either attached as shown or situated on the pipe c.

27,316. Daniel, P. G. E., and **Foot, A. T.** Dec. 10.



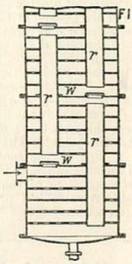
Heating water; heating by steam circulation.—In a hot-water system in which water for domestic purposes is heated in a hot cylinder D by steam from a kitchen boiler A passing into a coil or annular chamber E, a steam-escape pipe G fitted with a whistle is connected to the return pipe from the chamber E to the boiler, to give warning if the steam ceases to be wholly condensed in the chamber E. The boiler A is

supplied through a non-return valve from a cistern F fitted with a ball tap and a level indicator. Steam generated in the boiler passes through a steam separator and superheater C, which, according to the Provisional Specification, may consist of a cylindrical casing containing baffle-plates perforated at the centre and periphery alternately. The cylinder D is supplied from a separate cistern, and is fitted with the usual escape pipe J.

27,496. Kubierschky, K. Dec. 12, 1906, [*date applied for under Patents Act, 1901*].

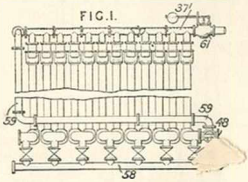
Heating liquids. —Packed towers for heating liquids by means of gases or vapours, which become heavier as they rise, are divided into chambers by horizontal partitions *w* permeable by liquid and not by gases, and the chambers are connected by internal or external pipes *r* so that the gases pass through the chambers in a downward direction. The tower may be filled with coke, balls, tubes, sieves, plates, &c.

FIG.2.



27,577. Wadham, R. Dec. 13.

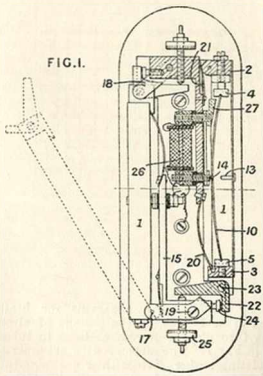
FIG.1.



Heating water.—The slime &c. that accumulate in the tubes of water-heaters and similar apparatus is blown out by water led into the top of the apparatus. The water-tubes, forming a series of sections, communicate at the bottom through cocks 51, leading from curved connecting-tubes, with the common blow-off pipe 58. The sections communicate two-and-two at the top through chambers 37¹ formed in a header pipe, by means of non-return valves. The header pipe is connected through the pipe 59 and the three-way cock 60 with the feed-water supply inlet 48. A safety-valve 61 is provided on the header pipe to relieve excessive pressure during the normal working of the heater, or during the blowing off process, the non-return valves being opened by such excessive pressure. To blow off any desired section, the cock 60 is turned to lead the water through the pipe 59 into the top header, through which it flows, opening the non-return valves, and the section it is desired to clean is put into communication with the blow-off pipe 58 by opening the corresponding cock 51. Modifications are described in which the headers connecting the sections at the top separately communicate with the pipe 59 by non-return valves; or the headers connecting the sections at the bottom communicate by non-return valves, and the sections communicate with the pipe 59 through cocks on the top headers; or both top and bottom headers are formed by non-return valves in the top and bottom connecting-pipes respectively.

27,608. Geissinger, H. G. May 29, [*date applied for under Patents Act, 1901*].

FIG.1.



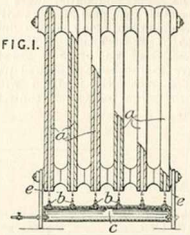
Thermostats.—The thermal couple of a thermostat is formed by an expansible rigid element and a less expansible flexible element. Fig. 1 shows two thermostats mounted on one frame 15. Specification No. 25,036, A.D. 1908, is referred to. Each thermal couple consists of an expansible rigid channel-shaped bar 1, provided at its ends 2, 3 with screws 4, 5, between V-shaped grooves in the heads of which is sprung a flexible strip 10 of spring steel or other material less expansible than the bar 1. The heads of the screws 4, 5 are also provided with square grooves, at right-angles to,

and deeper than the V-grooves, in which tongues at the ends of the flexible strip 10 engage to prevent lateral displacement. The screw 4 is adjustable for varying the curvature of the strip 10, and a pin 13 prevents reverse curvature. The flexible strip 10 is adapted to close a circuit through an insulated contact-screw 14 carried by the frame 15. The screw 14 is preferably of iron, and may form one pole-piece of an electro-magnet 26 in the regulating-circuit, and by its attraction on the strip 10, may prevent the circuit from being broken until a definite change of temperature has taken place. The other pole-piece 27 is of considerable area, so as to exert only a small attraction on the strip 10. The bar 1 is pivoted at its upper end 2 to an arm 18, pivoted to the frame 15 by a screw 19. To the lower end 3 of the bar 1 is loosely pivoted a bell-crank lever 22, the shorter arm of which abuts against a screw 24, while the longer arm is adjustable by a calibrated screw 25 for adjusting the temperature at which the device operates. Springs 20, 21 prevent vibration of the bar 1 and lost motion at the pivots 17, 23. The strip 10 may be concave to the contact-pin 14, so that contact is made on expansion of the thermal couple.

27,665. Watts, C. J., Haden, J. P., Haden, W. N., and **Haden, C. I.** Dec. 14.

Heating buildings &c.—A gas-heated radiator consists of a number of hollow sections *a* mounted on end supports *e*, between which is placed a chamber *c* supplying gas to the burners *b*. The hot air &c. from the burners pass through the sections *a*, and away through apertures in the outer sides of the end sections, or in other convenient parts. The chamber *c* is preferably made with a shallow section, so as to heat the gas as it passes through it, and its upper surface is polished to reflect the light from the burners.

FIG. I.



27,681. Jones, W. F. Dec. 16.

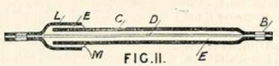


FIG. II.

Heating by electricity.—A resistance D, applicable for heating by electricity, is embedded in fire-proof insulating-material E in a metal tube C, flattened at one end so that the tube acts as one terminal. The other terminal may consist of a cap L. The tube C may be flattened or corrugated.

27,881. Jensen, A. Dec. 18.

Heating liquids.—An apparatus for pasteurizing milk or cream, or for heating or cooling liquids, having a rotatable spiral coil 12 through which a heating or cooling medium may be passed, is provided with means for making fluid-tight joints at the bearings of the coil. The coil is connected with sleeves 8, 9 secured to a hollow shaft 6, 7, the joint between each bearing 5 and sleeve being made tight by providing the sleeve with an annular tongue 45, Fig. 3, which fits in a groove 46 in the bearing, longitudinal adjustment being made at one end by means of screws 47. The ends of the hollow shaft carry stuffing-boxes 22,

FIG. I.

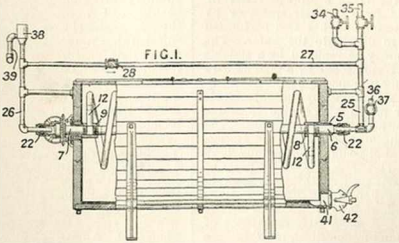
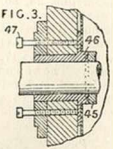


FIG. 3.



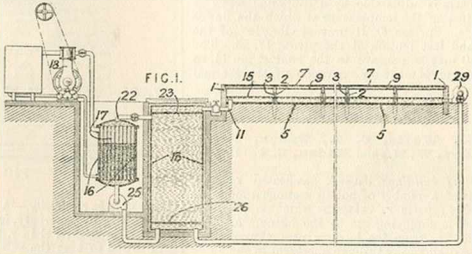
connected with supply and outlet pipes 25, 26 through which a cooling or heating medium is passed. The coil is rotated by a pulley through bevel-wheels. A steam injector 36 is used for heating. The supply and outlet pipes 25, 26 are connected together by a pipe 27 fitted with a check valve 28, thereby providing a complete fluid circuit. Valves 34, 35, 37 are used for regulating the supply of liquid &c., and an overflow vessel 38 and pipe 39 serve to provide any desired pressure in the coil. The receptacle is lined with metal, and has a discharge passage 41 controlled by a gate valve 42.

28,117. Weidinger, E., and **Kahn, H.** Dec. 20.

Non-conducting coverings and compositions.—Insulating and weather-, water-, and acid-proof plates &c. are made by a cold process from asbestos, clay, and water-glass. Colouring-matter, powdered stone, and india-rubber solution may be used in addition. For example, 350 grams of fine china clay, 20 grams of disintegrated asbestos, and 50 grams of stone dust, all dry, are mixed with concentrated water-glass solution and pressed to the desired form.

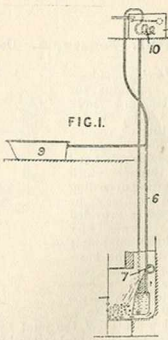
28,130. Shuman, F. Dec. 20.

Solar heat, utilizing; heating liquids; heat-storing apparatus. — Water, or any heavy oil, or glycerine is heated by solar rays in a shallow tank, the heat absorbed being used for vaporizing a second liquid to drive a vapour engine. The tank is enclosed by a wall 1, and has a floor 5 of heat-absorbing and preferably black material, such as asphalt or pitch, the tank being divided by partitions 3, fixed between posts 2 driven into the ground, and covered by two layers of glass 7, 9 to prevent air circulation and loss of heat. The glass may be flat or arranged in ridges. The water is preferably covered by a layer of non-flowing liquid 15 to prevent loss of heat. The heated water passes through a pipe 11 to a storage vessel 13, which is surrounded by a dead-air space, or by non-conducting material, and has two perforated diaphragms 23, 26 to distribute the water. The lower diaphragm 26 may be replaced by a slidable piston. The vessel is connected by a pipe 22 with a vaporizer 16, having tube-plates at the ends connected by tubes 17, surrounded by the vaporizable liquid. The vapour passes to an engine 18, and is condensed and returned to the vaporizer. The water returns to the lower part of the storage vessel, and to the heat-absorbing tank, pumps 25, 29 being used if necessary. The sizes of the parts of the apparatus are arranged so that the water in the storage vessel may be sufficient for running the engine when no heat is being received by the heat-absorbing tank. A modified arrangement of the heat-absorbing tank is described, in which the roof has sloping parts.



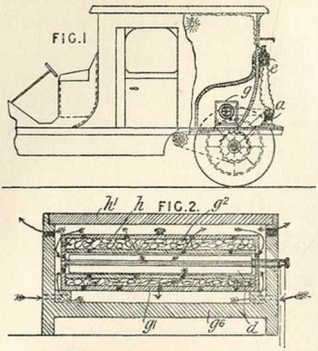
28,246. Thomas, D. J., and **Evans, W.** *June 17, 1908.*

Heating water.—Water from a kitchen boiler passes through an auxiliary horizontal heating-coil 7 in the flue, whereby sufficient hot water for a bath 9, for instance, can be rapidly obtained, and a smaller boiler than usual used where the demand is small. The hot-water pipe 6 enters a cold-water cistern 2 through a coil 10, by which any steam formed is condensed. A hot-water circulating cistern may be provided, supplied with cold water by a ball



valve, or this cistern may be connected to the boiler by only a single pipe, especially when the bath is on a level with the boiler; a ball valve may then be provided in the boiler, which may be open.

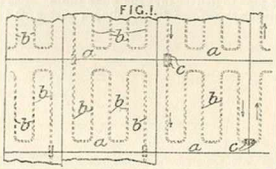
28,423. Grolms, F. Dec. 24.



Heating structures.—A road vehicle is heated by radiation from a charcoal stove *g*, Fig. 1, to which air is supplied by a fan driven from the shaft of a dynamo *a*, which is used for charging an accumulator *e* for lighting, and is itself driven from an axle of the vehicle. The dynamo may be dispensed with, and the fan be driven direct from the axle. The stove shown consists of a cylinder with double walls g^1, g^2, Fig. 2, having small apertures through which air passes, the charcoal being placed between the walls, and the fan *d* arranged within the inner wall. The stove has a jacket g^6 of earthenware, clay, or china, with holes at its ends. Lids *h*, h^1 allow the stove to be filled.

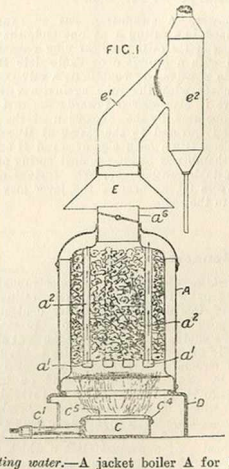
28,477. Barker, A. H. Dec. 27.

Heating buildings &c. — Floors and walls of rooms, halls, and other parts of buildings are covered with slabs or tiles, in which are embedded small pipes for conveying hot or cold water, brine, &c. The slabs are made of plastic material which afterwards solidifies; they may consist of linoleum or lincrusta for large areas, where the heating-fluid may be at a low temperature, or of brick or unglazed earthenware containing much iron oxide to render it heat-conducting, where high temperatures are necessary. Pipes in consecutive slabs may be connected by unions, for which spaces *c* are left, the spaces being filled when the slabs are laid. Fig. 1 shows slabs *a* applied to a floor, the left and right sides of the Figure indicating respectively the arrangements when supply and



return pipes are at opposite ends, and at the same end of the room. Such slabs may be fixed by screws or nails at the corners, and may be connected together by cement or by the material of which they are made. The whole of a wall or floor may be heated &c., or a part, such as panels or a dado.

28,668. Fenwick, R. Dec. 31.



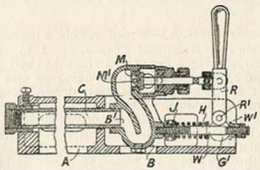
Heating water.—A jacket boiler A for heating water for circulation surrounds refractory material raised to incandescence by gas burners, and is

provided with cross water-tubes a^1, which act as a grating to support the refractory material. Upwardly-extending circulating-tubes a^2 may lead from the cross-tubes to the upper part of the boiler, and the circulation of the water through these tubes may be assisted by arranging the water inlet pipe to deliver into the cross-tubes. The gas burners are formed by dividing a casing C into compartments, a detachable cover c^4 being provided with a burner slot c^5 for each compartment. Gas is supplied by several conduits c^1, so that any burner may be individually adjusted. The combustion products, which may be led through jacketing-flues round the heater, are collected by a hood E, and pass through a condensing-chamber e^2 where water &c. separates.

A.D. 1908.

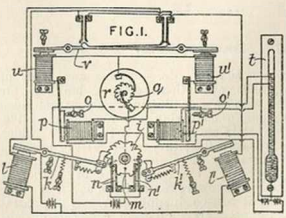
25. Jeffery, W. H. Jan. 1.

Steam-traps.—A steam-trap has an expansion tube C fixed in a casing A at one end, the other end sliding in the casing and carrying a chamber B provided with a dip-piece or baffle-plate B^1 and leading to a valve-box containing a valve-seat M, which moves with the tube against a valve M^1. The valve is also moved towards the seat by a lever R operated by the expansion of the tube; the lever is pivoted to the casing at R^1 and has forked pieces G^1 on each side of a rod H screwed into the chamber B bearing against spring-pressed and adjustable washers W, W^1. Instead of the forked pieces G^1, an arm of the lever may move in a slot in the rod.



155. Rennert, O. Jan. 2.

Thermostats.—Consists of an electro-magnetic regulating or switching apparatus operating upon changes of temperature and under control of a contact clock to work a valve or the starting-switch of a ventilator. In the arrangement shown, the spindle of a valve carries a disk *i*, having, on each half circumference, oppositely-directed teeth engaged by pawl levers *k*, k^1 acted on by the electro-magnets *l*, l^1. The disk *i* is provided with a pin *m*, which, in its end positions, breaks the spring-contacts *n*, n^1. The latter are connected to the contacts *o*, o^1 of the magnets *p*, p^1 and to the switch-wheel *q* of a contact clock *r* which closes the circuit at definite intervals. By means of the contact thermometer *t*, when the temperature exceeds a certain limit, the electro-magnet *p* is



energized and attracts its armature, which engages the screw *o*. When the clock-work *r* closes the circuit, the electro-magnet *u* is energized and attracts its armature *v*, thus closing the circuit through the electro-magnet *l*. This electro-magnet then attracts the pawl lever *k* and causes the disk *i* to be rotated for one tooth space so as to partly close the valve. This operation is repeated at intervals when the clock-work *r* closes the circuit, until the mercury in *t* falls below the upper contact or until the pin *m* breaks the spring-contact *n*, when the valve is no longer acted upon. If the mercury falls below the lower contact, the electro-magnet p^1 is de-energized and the contact o^1 closed. When the switch-wheel *q* now closes the circuit, the electro-magnet u^1 is energized and closes the circuit through the electro-magnet l^1, thus attracting the lever k^1 and rotating the disk *i* so as to open the valve. In a modification of the apparatus for regulating an electrically-driven ventilator or fan, the disk *i* is connected to the switch-lever of a starting-resistance. When the temperature is below the required value, the switch-lever stands over the switching-off contact and the apparatus is at rest. When, owing to the rise of temperature, the mercury reaches the contact wires, the switch-lever is moved away forwards at intervals regulated by the clock, thus gradually increasing the fan current. If the temperature falls, the switch-lever is rotated in the reverse direction, thus gradually cutting out the current.

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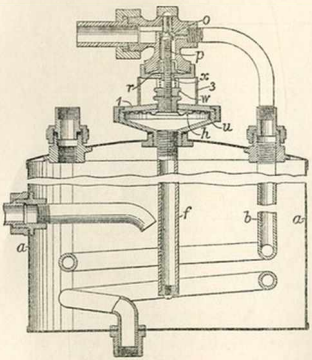
223. Jones, C. J., and **Still, W. M.** Jan. 3.



Heating water; thermostats.—A water-heater *a* heated by a steam coil *b*, or by a Bunsen burner, is fitted with a thermostat for controlling the supply of steam or gas. A tube *f*, against which the water-inlet pipe discharges, is filled with a volatile liquid, and is closed by a diaphragm *h*. A rod *p* attached to a valve *o* in the steam or gas supply pipe, is fitted at its lower extremity with an adjusting-nut, which rests upon, and is pressed down against the diaphragm *h* by a spring *x*. A lock-nut *w* holds the adjusting-nut in position. A second diaphragm *r* round the rod *p* closes the valve chamber. Cover-plates 1, 3 to prevent injury are provided for the diaphragm *p* and adjusting-nut.

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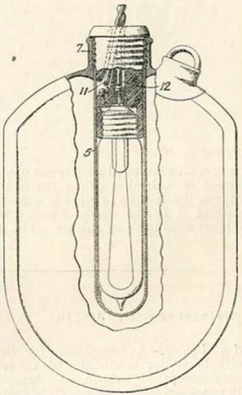
324. Christian, H. W. Jan. 8, 1907, [*date applied for under Section 91 of Patents &c. Act, 1907*].



Hot-water bottles &c.; heating water &c.; heating by electricity.—In an electrically heated hot-water bottle, an incandescent lamp enclosed in a metal sheath 5 is inserted through an enlarged opening in the bottle. The plug 7, carrying the lamp and the wires 11, 12, is screw-threaded to engage the sheath 5.

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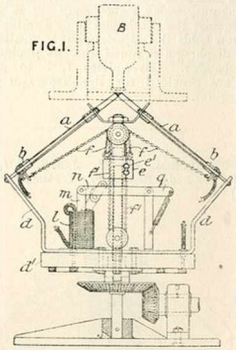
390. Cummins, M., and **Schwenzfeier, C. W.** Jan. 7.

Heating by electricity.—The mouths of glass bottles &c. are fire-polished by exposing them to the arc. Carbons *a* are mounted diagonally on

slides *b*, to which chains *f* are attached. The weight of the carbons *a* is counterbalanced by a weight *e*. To regulate the feed of the carbons, the current is passed through a solenoid *e* provided

FIG. 1.



with a core *m* attached to pivoted levers *n*, *q*. The arrangement is such that, when the core *m* is drawn down, the levers *n*, *q* grip the endless chain *f* attached at e^1 to the weight *e* and draw the carbons apart so as to strike the arc. The lamp is on a rotatable table *d*, and the bottles &c. B may be brought over it by a conveyer.

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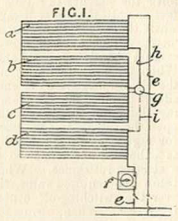
549. Trümpler, W. B. Feb. 1, 1907, [*date applied for under Section 91 of Patents &c. Act 1907*].

Heating by electricity.—An electric heating-fabric preferably for use with alternating currents, has heating-wires forming warp threads, which are connected in parallel in groups, the groups being connected in series so as to divide up the applied electric pressure and so prevent the formation of an arc if one wire in a group is broken. Fig. 1 shows diagrammatically an arrangement consisting of four groups *a*, *b*, *c*, *d* connected in series with a choking-coil *f*, having an adjustable air-space for regulating the current. A differentially-wound coil *g* may be provided, having windings *h*, *i* connected across two groups, so that, if a sufficient alteration in the subdivision of the electric pressure occurs, the core of the coil actuates a cut-out. The fabric may form the inlaid fabric of linoleum, to be better protected from damage.

FIG. 1.



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601. Salvisberg, O. Jan. 10.

Heating liquids.—An apparatus for dressing roads with heated tar is mounted on the frame 1 of a steam-propelled vehicle. A steam-driven pump 18 raises tar, while the vehicle is stationary, from a portable vessel through pipes 20, 15 into one or other of two chambers 5^1, 5^{11} of a tar boiler 5. The tar is heated by a steam-coil 7 or 8 till it froths and overflows through a pipe 16 or 17, the second chamber of the boiler 5 being meanwhile filled with tar. The supply of steam to the heating-coil is then cut off, and valves are opened so that the heated tar is forced by steam pressure through a pipe 29 or 30, a filter 28, and a flexible pipe 31 to a pivoted perforated distributing-pipe 32. The vehicle is meanwhile set in motion, and the tar in the second chamber is heated in a similar manner.

FIG. 1

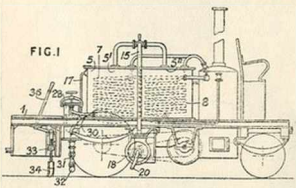
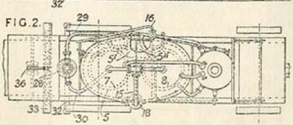
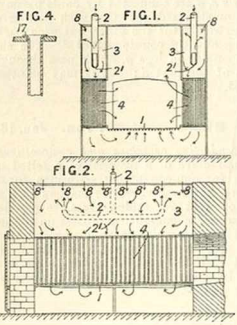


FIG. 2.

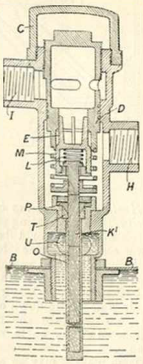


615. Magnée, C., and **Demeure, E.** Jan. 10.



Heating air.—A mixture of air and exhaust steam is heated in one or more chambers 3 and series of tubes 4 at the sides of a furnace before passing to the ash-pit, which is closed. Steam enters the chambers 3 through pipes 2 having openings 2^1 for the escape of water of condensation, and air enters at the top through adjustable openings at 8. The mixture then passes through the tubes 4 to the ash-pit and through the grate 1. To enable the tubes 4 to expand without deformation, they are suspended from the top tube-plate by a flange 17, Fig. 4, and are simply inserted into the bottom tube-plate.

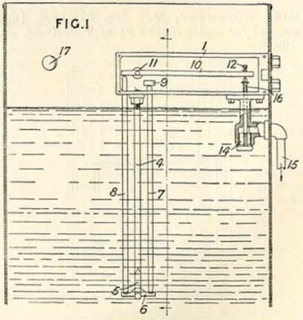
686. Horne, A. D. Jan. 11.



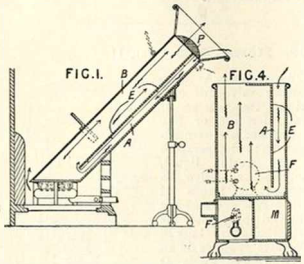
Thermostats.—A thermostatic valve for controlling the passage of steam, hot air, or like heating-medium in accordance with the temperature of the heated liquid, comprises a valve E operated by means of gutta-percha enclosed in a tube O dipping into the heated liquid in the tank B. The valve E slides in an adjustable guide D mounted in a cylindrical casing having a steam inlet H and an outlet I, and a hot-water outlet U, the top being enclosed by a cap C. The expansive material operates through a plunger K^1, which transmits pressure to close the valve through the medium of a weak spring L. The opening of the valve is effected by a strong spring M. The plunger is packed by a conical-shaped piece P which leaves a space T under it, in which any leakage or excess of the expansive material may collect.

744. Beyer, C. E. Jan. 13.

Thermostats.—A thermostat, which allows hot water to escape from a tank containing cooling-water for an internal-combustion engine, consists of two expansion rods 7, 8 supported by a saddle 6 on a rod 4, the expansion rods opening a valve 14 by means of a lever 10. One expansion rod 7 bears against a fixed stop 9, and the other 8 engages the shorter arm of the lever 10, so that the expansions of the two rods are added together. The supporting-rod 4 projects downwards from a box 1 placed just above the water level, and has at its lower end a stirrup 5 to which the saddle 6 is pivoted. The valve 14, which is closed by a spring 16 and may be adjusted by a screw 12, allows hot water to escape through an overflow pipe 15. The valve admitting cold water through an opening 17 may be controlled by a tali-cock, or by the thermostat. More than one pair of expansion rods may be used in series, so that the expansions are added together. The rods may be placed horizontally in the hot water at the top of the tank.

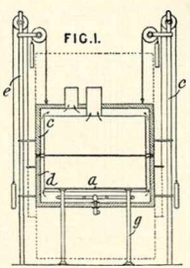


904. Spong, J. O. Jan. 14.



Heating air; heating buildings; heating by electricity.—An air-heating stove for warming a room consists of a box or tube B, Fig. 1, closed at the lower end and divided by a plate E, or provided with an inner tube, reaching nearly to the bottom; the closed end of the box is heated by an oil, gas, or coal stove, or an electric heater, so that a current of air is produced down one side A of the box and up the other into the room. The box may be supported at any angle with the vertical, and the open end may be covered with gauze P. The division plate E may be adjustable, or a valve may be used for regulating the supply of air. The air may be moistened by water in a jacket or tube. Fig. 4 shows the box as vertical and heated by a gas burner F, a compartment M being provided for warming food.

1108. Sprenger, P. Jan. 31, 1907, [*date applied for under Section 91 of Patents &c. Act 1907*].

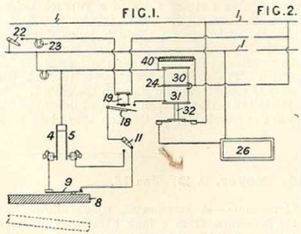


Heating-apparatus.—A heating-chamber consists of two box-like parts *c*, *d*, which may be moved vertically simultaneously or independently so as to afford access to the materials on the fixed support *a*. In the construction shown in Fig. 1, the two parts *c*, *d* are connected by cords passing over pulleys on standards *e*, so that each part serves as a counterweight for the other, but each part may be independently counterweighted. The support *a* is mounted on legs *g*, which pass through the bottom of the part *d*; but it may be otherwise mounted.

1247. Skorzewski, W. von. Jan. 18.

Non-conducting coverings and compositions.—In the manufacture of a material of a felted nature suitable for non-conducting coverings for walls, furniture, &c., fresh vegetable matters such as the leaves of root vegetables, grass, reeds, &c. are subjected to a comminuting process until they are reduced to pulp, which is then moulded into any desired shape without pressure and dried with or without artificial heat. The leaves &c. may be heated by steam before the termination of the pulping process.

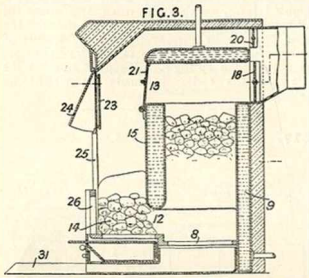
1304. Geissinger, H. G. Jan. 20.



Heating by electricity; heating by steam circulation; heating by water and other liquid circulation; heating buildings and structures; thermostats.—The temperature in each of a series of places is independently regulated by a differentially-wound electric regulator controlled by a thermostat and provided with an electrically-operated switch, all these switches being in series and controlled by a switch at a central point. The invention is shown as applied to a series of rooms, each heated by an electric heater 26 supplied from mains 1, 1. Each room is provided with a differentially-wound electric regulator 24, one winding 31 of which is in circuit with a thermostat 4, the other windings 30 of all the regulators 24 being in series across the mains 1, 1. Two or more thermostats 4, 5 set for different temperatures may be employed in each room, a switch 11 in the room enabling any one to be placed in circuit. An electro-magnet 19 is provided in each room, and, when energized, attracts an armature 18 and completes the circuit

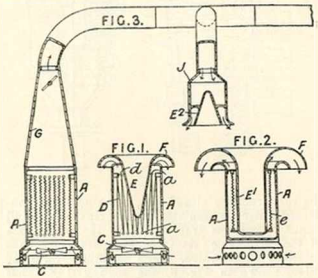
through the thermostat 4. The electro-magnets 19 are all in series between the mains 1, 1, and are also in series with a switch 22 by which the circuits of all the thermostats may be simultaneously broken from a central controlling position, at which an indicating-lamp 23 may also be provided. The regulator 24 consists of a differentially-wound solenoid, one winding 30 of which is normally excited, and, acting alone, lifts the core 32 and cuts off the heat supply by breaking the circuit of the electric heater 26, or by closing the regulating-valve of a steam or hot-water radiator. When the circuit through the thermostat 4 is closed, a current flows through the winding 31, neutralizing the magnetic effect of that in the winding 30, and allowing the core 32 to fall and close the heater circuit. The winding 30 is provided with an inductive resistance 40 to take up the kick on the break of the circuit. A switch 9 is provided to break the circuit of the high-temperature thermostat 4 when the door 8 of the room is left open. The regulator 24 may control an electric motor operating the dampers or valves of furnaces, or the valves of heaters or other apparatus; or it may regulate the temperature of electrically-heated tools.

1540. Newcome, V. N. Jan. 22. [*Patent of Addition to No. 23,212, A.D. 1907.*]



Heating water.—A combined close and open stove is provided with a boiler 9, which forms the back 15 of the open fire-place 14, and encloses a slow-combustion fire, a passage 13 closed by a damper 21 being left at the top for supplying fuel, and a passage 12 at the bottom by which the two fire-places communicate. Dampers 20, 18 are fitted in the flues, and the draught through the open fire is also controlled by a dead-plate 31, which can be turned up to cover the fire-bars 26, a sliding plate 23, which closes the open space 25 above the fire, and an adjustable hood 24. The grate of the rear fire is preferably fitted with shaking fire-bars, and is situated a little below that of the open fire, so that the corresponding ash-trays may be removed separately. Extra flues for the rear fire may pass through the boiler at the sides of the main flue. The boiler may be constructed in a single piece or in sections, and may be of the water-tube or fire-tube type. Specification No. 23,212, A.D. 1907, is referred to.

1696. Frank, L. A. Jan. 24. [*Cognate Application No. 6931, A.D. 1908, dated March 28.*]

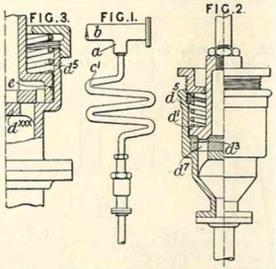


Heating by electricity; heating buildings.—An air heater has straight or zigzag wire D, *e* stretched on studs *a* inside a casing A, so that the whole surface of the wire is exposed to air circulated through the heater. In the form shown in Figs. 1 and 2, a conical or cylindrical inner casing E, E^1 with an overhanging flange F, discharges the air outwards. Fig. 3 shows a central heating-apparatus delivering air through bell-mouthed pipes fitted with baffle-cones. The studs are supported on a frame *d* fixed to the casing, or may be supported on the inner casing forming the baffle. The wire may be arranged as shown in Fig. 1, or in vertical or horizontal lines, or may form a spiral. A number of concentric casings may be used, the wire being arranged between them. The circulation of air through the heater is produced by a fan C driven by clock-work or by natural draught alone. When the apparatus is used as a central heater, a hood G, Fig. 3, conveys the air to branch pipes provided with dampers, and having bell-mouth openings J, fitted with baffle-cones E^2 for throwing the air outwards. The branch pipes may be taken directly from the top of the heater.

1769. Bertram, N. S. Jan. 25.

Steam traps.—A flexible zigzag or coiled tube c^1, Fig. 1, is fitted to a pocket *a* in a steam-pipe *b*, and carries at its lower end a valve d^1, Fig. 2, kept on its seat by a coiled spring d^2. The valve

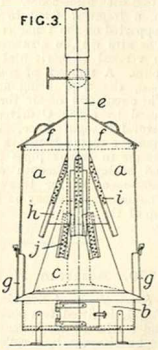
has a removable seating d^3 and the spring is adjusted to balance the steam pressure. When the pipe c^1 is full of steam, the pressure of this on the valve is reduced by condensation so that



the valve remains closed, but, when sufficient condensed water accumulates in the pipe c^1, the full steam pressure is transmitted to the acting face of the valve, which rises. The apparatus can thus act as a safety-valve. In a modified form of valve, shown in Fig. 3, the seating $d^{\times\times\times}$ has ribbed openings through which the water escapes, and the valve has a ring e to prevent leakage. The movement of the flexible pipe c^1 indicates whether the trap is working.

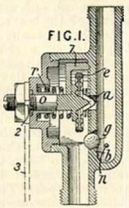
2009. Biss, A. J. C. Jan. 29.

Heating water.—Apparatus for sterilizing soil, manure, &c. comprises a conical container *a* with a conical boiler *c* mounted above a furnace *b*. The boiler has a central flue *e*, to which is riveted a conical bonnet or hood *h* extending down over the open top of the boiler. Open ended perforated ducts *i* open to the boiler on the underside are fixed to the outside of the boiler, and similar ducts *j* are secured to the hood *h* and interspaced with those on the boiler. The earth &c. is introduced through doors *f* at the top of the container, and, after being permeated with steam and heated by the heat from the boiler and flue, is removed through doors *g*.

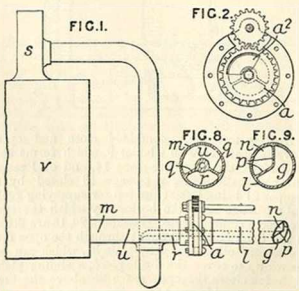


2148. Mason, C. L., and **Still, W. M.** Jan. 30.

Steam traps.—A steam trap has two discharge openings *a*, *b*, the former of which is controlled by an expansible capsule *e* of the type described in Specification No. 21,571, A.D. 1902; the other passage *b* is normally closed by a ball valve *g*, which is held on its seat by steam pressure and falls away or is raised by a weighted lever when steam is cut off, so that when steam is again turned on, grit is blown past the ball while it closes. The ball valve and also the capsule may be movable by hand. A stem *o* carrying the capsule has an arm 7, which, when the stem is turned by a key or by a lever 3 engaging with recesses in an adjusting-nut 2, forces the ball from its seat so that steam blows through the lower opening. In a modified trap, a cam on the stem forces down one arm of a weighted lever, so that the other arm opens the ball valve. Steam may also be blown through the upper opening by forcing inward the handle of the lever, so that the capsule is withdrawn against the action of a spring *r*. The joint between the stem and the casing is made water-tight by packing.



2517. Flux, G. B. Feb. 4.

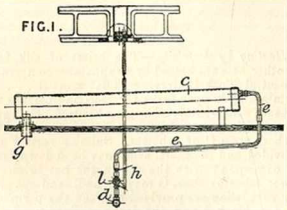


Heating air &c.—A supply of air or gas may be controlled while its temperature is regulated by

means of a single rotary disk valve. The invention is especially applicable to carburettors for internal-combustion engines used on motor road vehicles. A pipe *l* leading to the valve *a* is divided by partitions *p* into two unequal passages *n*, *g*, Fig. 9, hot air passing through the passages *n* and cold air through the passage *g*. The pipe *m* leading from the valve is divided by partitions *q* into passages *u*, *r*, Fig. 8, the passage *u* leading to the carburettor *v* and the passage *v* being a by-pass passage into the induction pipe *s*. The valve *a* has a sector-shaped port a^2. By adjusting the valve, cold air can be sent through the main passage or divided in any desired proportions between the main passage and the by-pass; hot and cold air in any desired proportions may be sent through the main passage; hot air alone may be sent through the main passage; or hot air may be sent through the main passage and cold air through the by-pass in any desired proportions. The by-pass and the passage *r* may be omitted.

2559. Pearson, G. H. Feb. 5.

FIG. 1.



Heating buildings &c.—Relates to steam-heating systems, specially applicable to railway trains, in which high-pressure steam passes through a small hole in a valve to a heater open to the atmosphere, the steam being thereby reduced in pressure and condensed on the walls of the heater. In the present invention, means are provided for automatically cleaning the hole each time the heater is used; also, if ice should form in the outlet of the heater, it is readily removed by the entering steam. Fig. 1 shows the general arrangement of the apparatus, as applied to a railway carriage, and Figs. 5 and 6 show forms of automatic self-cleaning valves. Steam from the main steam-pipe *d* passes through a branch pipe *e* to the heater *c*, which may be of any shape, and is slightly inclined to allow the condensed steam to drain away to the outlet *g*. This is made larger at its outer end in order that should a plug of ice form within it, it will easily be removed by the steam-pressure. In the branch pipe *e* are placed a three-way cock *l* operated from within the carriage, and the casing *h* of the automatic self-cleaning valve shown in Fig. 5. The ball valve *j* lies normally on the bottom seat which is cut away to allow water in the branch pipe to drain away. When steam is turned on, the valve *j* rises to the top seat *i*, which

FIG. 5.

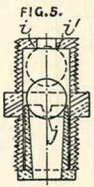
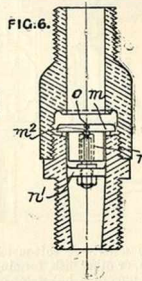


FIG. 6.

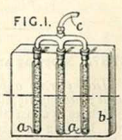


has a groove i^1 for the passage of steam to the heater. Any foreign matter collecting in the groove i^1 will be withdrawn by the ball valve when steam is turned off. Instead of the ball valve, a disk valve *m*, having guides m^1, Fig. 6, may be used. A hole m^2 in the valve is provided for the passage of steam; this hole is automatically cleaned when the valve falls, by means of a pin *o* supported from a web n^1 so that it protrudes slightly through the hole. A disk valve may be used having a groove in the face of its seat. The casing of the three-way cock *l* is provided with an orifice open to the atmosphere, so that when steam is turned off the branch pipe is in communication with the atmosphere to drain away the water of condensation.

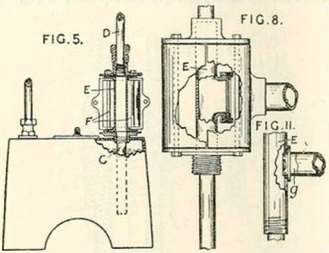
2613. Jacob, F., Jacob, E., Alexander, R., and **Serenyi, A.,** [*trading as* Jacob Geb. und A. Serenyi, Pressluft Ges.]. Feb. 5.

Heating liquids.—Canes, reeds, &c., from which the peel or outer coating is removed in parts, for use in passing air, steam, carbon dioxide, &c., through a liquid, as described in Specification No. 28,393, A.D. 1906, [*Abridgment Class* Closets &c.], are mounted in a base or support formed of cork, sand, celluloid, sheet metal, aluminium, &c. Fig. 1 shows a device for use in a bath, consisting of canes, &c. *a*, having their upper surfaces cut away, and mounted in a base *b*. The device is supplied with air through a pipe *c* by a hand pump or otherwise, or with steam, carbon dioxide, &c.

FIG. 1.



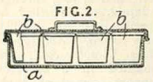
2744. Nettleship, W., and **Nettleship, W.** Feb. 7.



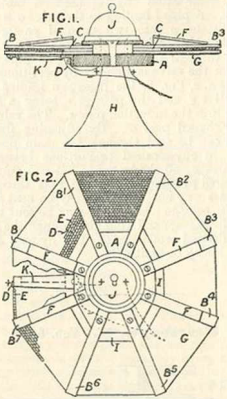
Heating water.—A soft-metal sleeve, or a soft lead, mica, or other disk, forming part of the inlet or return pipe of a hot-water circulation boiler, is employed so as to burst when the boiler pressure is excessive, thus preventing explosions. In one form, shown in Fig. 5, a casing is fitted to the boiler, into the top and bottom of which the two parts D, C of the return pipe are screwed. Within the casing, a soft lead or other pipe E is secured, for example by bolting flanges formed on the soft pipe between the removable top and bottom of the casing and inturned flanges on its body. The body of the casing is preferably in two parts, the whole being secured together by bolts F and nuts. An outlet with an escape pipe is formed in the casing. In place of the pipe E, the casing may have a passage running through it and forming a continuation of the return pipe, one side of the passage having an aperture normally closed by a disk of lead, mica, or other material. Fig. 8 shows another arrangement in which a removable pipe E has a flanged opening covered with lead, mica, &c. secured to the pipe by a bolted ring. The casing may be dispensed with, a flanged escape pipe being secured to the flange of the pipe E. Fig. 11 shows a form in which the return pipe has a hole in it, into which is secured a flanged escape pipe *g* with a soft disk.

2787. Norzagaray, L. Feb. 7.

Heat-storing apparatus; heating liquids.—Relates to apparatus for treating rubber latex, which is placed in a series of long beaded-edged trays *b* supported in a hot-water jacket *a*, which may, if desired, be placed over a fire.

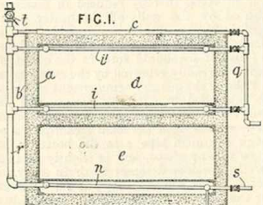


2790. Molins, W. E. Feb. 7.



Heating by electricity.—The brims of silk, felt, or other hats are heated by an apparatus comprising a central block H carrying radial arms B . B^2 terminating in open forks for receiving electric resistance wire D insulated by glass beads E. Each arm B . B^2 consists of two metal strips separated by a short strip C of asbestos. Suitable rests F are provided, and the radial arms may bend downwards to correspond with the dip in the hat brim. A lower asbestos sheet G may be used, and spaces I for ventilation are provided between the periphery of the block A and the inner periphery of the heating rim. A switch J and a fuse K are provided.

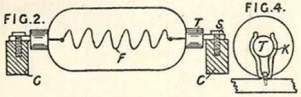
2807. Humphrey, G. F. Feb. 7.



Heating by steam circulation. — Superheated steam is led by a pipe *q* from an independently-fired superheater into a hot-plate *c* and sets of

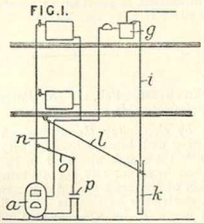
tubes i, i^1 in an oven d; it then passes by a cock t to the exhaust or is led by a pipe r through a set of tubes u in a warming-chamber e to an exhaust pipe s. Or the spent steam from the oven and hot-plate may be used for heating water in a tank or boiler.

2927. Howard, W. F., and **Cousins, A. B.** Feb. 10.



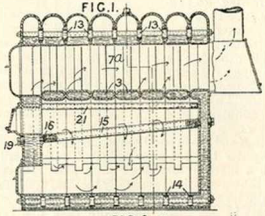
Heating by electricity.—An incandescent electric lamp for heating has a spiral or wavy filament F connected at opposite ends of the lamp to massive terminals T, which may be secured by screws S to contact-blocks C, or may be held in large spring clips K, Fig. 4, so that the terminal connexions are not damaged by heating. To allow for expansion, the terminals T, Fig. 2, may be slotted, spring washers being inserted between the screw heads and the terminals.

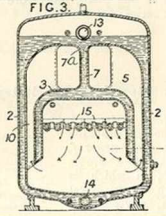
2970. Scholl, A. Feb. 10.



Heating by steam circulation.—Relates to means for regulating hydraulically-driven pumps for air &c. in connexion with steam-heating installations in which the pressure is reduced so that the apparatus may be worked at the same temperatures as hot-water heating-systems. The water leaves the actuating-device g by a siphon pipe i, which dips into water in a movable receptacle k. By altering the height of the vessel k which is attached to a lever l, the height of the column of water in the pipe i, and consequently the head under which the apparatus works, can be regulated. Instead of the pipe i dipping into the vessel k, it may end in a flexible pipe connected to the vessel k. The lever l is connected by a link n to a lever o carrying the damper p of the furnace a of the heating-installation. The position of the fulcrum of the lever o may be regulated by the pressure of steam in the boiler.

3016. Bosley, E. M. Feb. 9, 1907, [*date applied for under Section 91 of Patents &c. Act, 1907*].

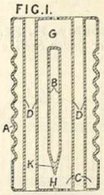




Heating water.—In a sectional boiler having a down-draught furnace, the gases pass upwards from beneath the grate 15 through vertical flues 10, and enter a horizontal flue 7^a extending through the upper part of the boiler. Each section consists of hollow water-walls 2 connected at the top and bottom, as shown, and containing a depending water chamber 3, which forms the sides of the combustion chamber. The sections communicate with each other at their top and bottom through nipples 13, 14. The chamber 3 is connected to the main water space by hollow webs 5, which form the sides of the vertical flues 10. The vertical passages 7, which connect the chamber 3 with the upper part of the main water space, form side walls of the horizontal flues 7^a. The sections of the water-grate 15 are connected to the boiler walls by hollow nipples 16, removable plugs 19

being provided in the outer walls to facilitate the insertion and renewal of the sections. Perforated tubes 21 placed above the grate supply air to the fire when the furnace door is closed.

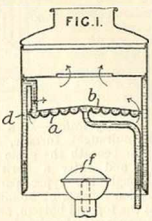
3028. Walker, J. M. Feb. 11.



Heating buildings &c.—Steam or hot water enters the radiator at H and is caused by a V-shaped deflector K to flow in equal streams through the annular space between outer tubes A and air-tubes D connecting the headers C, G. The outer tubes A are corrugated eccentrically in such a manner that their inner sides B are plain, and the corrugations gradually increase in depth to a maximum on their outer sides. The radiator may be cast in one piece, and more than one can be used in series.

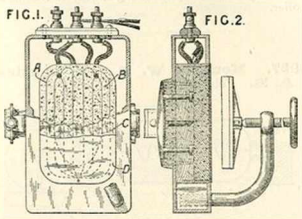
3098. Revai, I., and **Endrys, J.** Feb. 11.

Heating water.—A water heater, provided with a gas burner *f*, consists of a single plate *a*, in which is stamped a spiral channel, covered by another plate *b*, which can be easily removed for cleaning purposes by unsoldering the joint between the plates. Water from an outer jacket *d* enters at the outer edge of the spiral and flows out from the middle.



3250. Welch, W. H., and **Frost & Co., H.** Feb. 13.

Heating by electricity; non-conducting coverings.—Electrically-heated vulcanizers are constructed with a vegetable fibre, such as cork or wood, as the lagging and insulating material. The conductors A are disposed in the form of a superficies on the



block of cork B, and are covered with a plate of mica C, and over that is placed a thin metallic plate D.

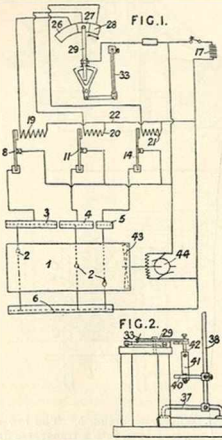
3532. Soc. J. Grouvelle, H. Arquembourg, et Cie. May 24, 1907, [*date applied for under Section 91 of Patents &c. Act, 1907*]. [*Patent of Addition to No. 27,207, A.D. 1907.*]

Foot-warmers.—A removable foot-warmer for automobile vehicles, as described in Specification No. 27,207, A.D. 1907, [*Abridgment Class* Locomotives &c.], and in which the exhaust gases are utilized for heating, is provided with baffles so as to act as a silencer.

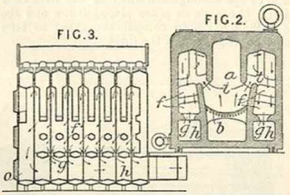
3544. Haas, M. Feb. 17. *No Patent granted* (*Sealing fee not paid*).

Heating by electricity; thermostats.—Apparatus for ventilating and heating by electricity consists of a cylinder 1 through which air is passed by a fan 43 driven by a motor 44, the air being heated by a number of heaters 2 arranged in groups, and connected electrically to circuits controlled by a switch 29 operated by a thermostat 33. The heaters are connected on one side to a common conductor bar 6 and on the other side through conductor bars 3, 4, 5 and electro-magnetic switches 8, 11, 14 to a battery 17 or other source of supply, these switches being operated by electro-magnets 19, 20, 21 connected to a common lead 22 and to contact-plates 26, 27, 28 over which the switch arm 29 is moved by the thermostat strip 33, in one or other direction, as the temperature is above or below normal. In order to alter the position of the contacts for any desired temperature, a pin 42, Fig. 2, carrying the contacts 28 can be adjusted in a sleeve 41, mounted on an horizontal bar 40,

which can be adjusted on two vertical end bars 38, also movable along horizontal bars 37.

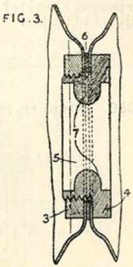


3564. Bolze, H. A. Feb. 17.



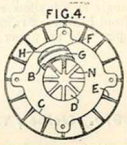
Heating water.—In a sectional boiler having a fire-box and furnace flue extending longitudinally through the sections, the gases from the fire-box *a* pass upwards through passages *i* between the sections to a lateral chamber *f*, and then downwards through outlets *g* to the flues *h* leading to the uptake. The outlets *g* are smaller than the passages *i*, so that some of the gases are compelled to pass diagonally through the chambers *f* to large outlets *o*, which are provided, preferably, in the front section. The fire-box is formed with outwardly-extending walls. The chambers *f* contain inclined and vertical water-tubes *t*, and the grate-bars *b* are preferably formed hollow and contain boiler water.

3677. Hager, J. Feb. 18. *No Patent granted (Sealing fee not paid).*



Heating buildings &c.—Each section of a radiator, adapted for hot-water or low-pressure steam heating, is made in halves stamped out of sheet metal, with flat edges which are welded together. The sections are held together by the joint shown. To the inner side of one half of one of the sections is attached an internally screwed ring 3, into which is screwed a short tube 5, formed with a flange 4 which bears against the next half section, shoulders 7 being formed inside the short tube to permit its being turned by a spanner. A packing-ring 6 is placed between the sections. The openings in the end sections are closed by plugs.

3931. Mavor, H. A., and **Main, A. P.** Feb. 21. [*Cognate Application No. 17,572, A.D. 1908, dated Aug. 21.*]



Heating buildings.—Water is heated in a vertical annular boiler between cylinders B, C, through the inner of which combustion gases pass. The outer cylinder C is furnished with radiating ribs E. Within the annulus is fitted a cylindrical diaphragm F which determines a circulation of the water up a passage G and down a passage H. The flue passage D can be divided, as shown, by webs N. The boiler may have flow and return pipes fitted, and may be used for circulating purposes.

3932. Mavor, H. A., and **Main, A. P.** Feb. 21.

Heating buildings &c.—To condense the vapours in the combustion products from a domestic or